

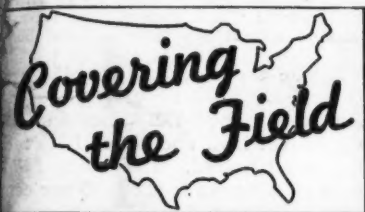
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Contractors and Engineers Monthly

Vol. 45, No. 8

AUGUST, 1948

\$3 a Year, 50 Cents a Copy



Building Construction

Steel seat plates for Ladd Memorial Stadium are welded to a steel framework placed on concrete foundation piles and bolted after erection. See this page: Materials for a new television station had to be raised 36 stories above street level in New York City (page 75).

Grading: Grade Separation

The 2-mile project through rock and swamp, covered on page 1, eliminated a dangerous hill and railroad crossing. A concrete overpass was built over the tracks.

Dam Construction

Design, history, job organization, and concrete-cofferdam work of Bull Shoals Dam are covered on page 2. The 7-mile conveyor for aggregate is described on page 82.

Expressway Paving

As reported on page 6, concrete-paving machines had to be altered for off-standard widths of Houston Expressway lanes. Feeder roads received a hot-mix topping.

Diversion Tunnel

Opening step at Tully Dam was to excavate and line with concrete a 300-foot river-diversion tunnel. See page 11.

Roadside Development

Page 22 tells how Louisiana is building roadside parks and dedicating them as memorials to the dead of World War II.

Three-Barrel Storm Sewer

The concrete sewer described in text on page 26 and in pictures on pages 50-51 is 2½ miles long and 54 feet across its 3-barrel width. It will drain 6,300 acres in the Borough of Queens, N. Y.

Highway Maintenance

Missouri's Division 5 makes a neat compromise between what it would like and what it can afford in highway maintenance. Details of its work are on page 35.

Airport Construction

A Class 3 airport contract (page 43) included draining and grading sandy soil and paving a runway with sand-asphalt.

Survey of Road Failures

Virginia capitalized on last winter's damage by instituting a survey of road failures and their causes which will influence her new road work. See page 47.

Levee Construction

There's an account on page 52 of how a willow mattress was woven and sunk to prevent sand scour along the bank of the Liberty Bend Cut-Off of the Missouri River.

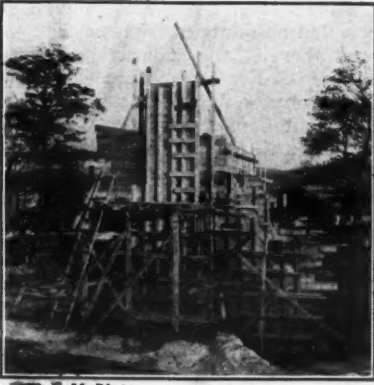
County Road Work

Page 58 tells how a metropolitan county mobilized to repair last winter's damage to its 1,800-mile main-road system.

Bridge Construction

Another old wooden covered bridge has been replaced by a modern steel and concrete structure. Truck-mixers supplied concrete to the job (page 63).

(You will find "In This Issue" on page 4)



E. M. Photo
Forms are shown in place for the pour on the north abutment of the bridge over the B. & M. RR at Meredith, N. H.

Road Relocated; Bridge Over RR

Grade Crossing and Steep Hill Eliminated on 2-Mile Project Through Both Rock And Swampland

THE New Hampshire State Highway Department is relocating a 2-mile section of U. S. 3, the Daniel Webster Highway, at Meredith, to eliminate a dangerous grade crossing with the Boston & Maine railroad at the foot of a steep hill. The existing 20-foot road, built in 1923, is well known by the average 12 per cent grade dropping down into town from the southerly approach. In places the hill steepens to a maximum of 19 per cent. At the foot of the hill is a grade crossing with three tracks of the B. & M.

Nothing much could be done to improve this hazardous condition by holding.

(Continued on page 19)

Football Stadium Is Of Steel Construction

MOBILE, Ala., will soon have a brand-new home for football games when the Ladd Memorial Stadium is completed in time for the opening of the gridiron season early this autumn. This modern football plant will seat 30,000 in its two stands at the sides of the playing field. Of practically all-steel construction, except for the concrete foundation footings and paved ramps, the stands have seat plates welded to a framework which is bolted together after erection.

The stadium is being built by J. P. Ewin, Inc., Contractors-Engineers of Mobile, and is scheduled for completion by Sept. 1. The official opening on Saturday afternoon, October 2, will have for its attraction a game between the University of Alabama, located at Tuscaloosa, and Vanderbilt University at Nashville, Tenn., always one of the classic football contests of the season.

The Ladd Memorial Stadium is named after the late Ernest F. Ladd, Mobile banker. Its construction is sponsored and financed by local civic-minded interests organized into a non-profit corporation. The 40-acre site for the field was donated by the City of Mobile. The entrance, on north side, fronts on Virginia Street, and is located far enough away from the downtown business district to avoid traffic jams. Spectators to the games will enter the stadium through gates behind each stand. Parking lots for cars are provided at the other three sides of the field, while the Virginia Street side has loading zones for buses. A 6-foot-high woven-wire fence runs back from the front brick wall to enclose the site.

Preparing the Field

Grading, drainage, and preparing the

Seat Plates Are Welded to Framework Which Is Bolted Together; Two Stands Will Accommodate 30,000

important turf of the field started two years ago—in 1946. Originally the site had been a brickyard, but had long since been abandoned. Brown clay lies beneath the black topsoil, and now contains both a drainage and irrigation system. Field drainage is to the south. Connections for sprinkler outlets are scattered over the playing turf, and are covered with rubber caps depressed in the ground so as to offer no hazard to the players.

Last year during the July to November dry season, the footings were excavated and poured to support the steel framework for the stands. The excavation went down from 1 to 6 feet below ground level which is at an average elevation of 31.0. The spread-type footings are founded in firm clay, and vary in size from 4 feet 2 inches square to 10 feet square. The larger footings are naturally in the rear of the stands where the greatest loads occur. The footings vary from 1 foot 3 inches to 1 foot 9 inches in thickness, and support loads averaging about 1,000 pounds to the square foot. From these footings rise concrete pedestals from 14 to 24 inches square, with their caps at elevation 33.0. The largest-size pedestals are for the light towers. The structural-steel columns of the stands are bolted to the cap plates of the pedestals.

The spacing of the footings varies with the layout of the stadium. The central feature, of course, is the 160 x 300-foot playing field with a 30-foot end zone at the north and south extremities of the field. Designed for football games only, the stadium has its stands on either side close to the playing field. Space did not have to be left for a running track as is often the case in stadium construction. The ends of the stands are only 20 feet from the edge of the field, while the maximum

(Continued on page 19)

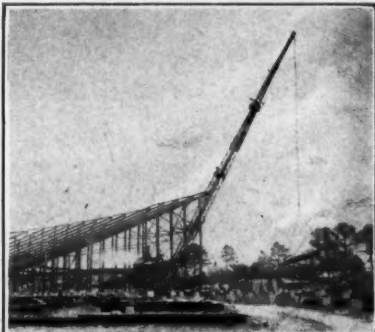
The 1948 ARBA Road Show

More than 100,000 visitors from 57 countries all over the world thronged the vast Soldier Field stadium and parking lot in Chicago, July 16-24, to see what contractors and equipment men say was the greatest display of modern construction and road-building equipment ever to be gathered together at one time. Sponsored by the American Road Builders' Association, the 1948 Road Show set an all-time record for attendance, and probably affected the techniques of all exhibitions to come.

For the first time in its existence, the Road Show was an outdoor affair, where construction equipment was exhibited in the open and with space to move around. In many of the display booths, machines were operated and demonstrated to some extent under their own power.

Tractor equipment, power shovels, concrete-construction machines, pumps, air compressors, new hauling units, street-maintenance machines, and literally hundreds of smaller units were shown. From the smallest improved model of a power saw to a huge new \$59,500 rubber-tired tractor-dozers with a 16-foot blade, the show blended past accomplishment with designs for the future. And pointing up the potential use of the new equipment on display, many lectures and discussions about new techniques and methods were featured at the ARBA's 45th Annual Convention which took place at the same time at the Stevens Hotel.

While most of the new, improved equipment displayed at the Road Show is in current production, and is available for limited delivery, some of the machines were merely pilot models and will not be perfected for a few months. According to manufacturers, these few units were brought to the Road Show so that contractors, engineers, and equipment men could visualize how these machines will advance road building of the future. Full details of the show and convention will appear in the next issue of CONTRACTORS AND ENGINEERS MONTHLY.



C. & E. M. Photo
This American steam crane with a 90-foot boom distributes steel members to their proper location in Ladd Memorial Stadium. The unit was also used in the steel erection.

Unique Concrete Cofferdam Commences Bull Shoals Dam

Massive Concrete Dam A Brilliant Achievement In Conception, Design, And Job Organization

FOR years, men have wanted to tame the White River in Arkansas by erecting a mighty concrete dam across its main stream.

Today that dream is on the way to becoming a reality, and soon Arkansas and the nation will benefit by it. For the dam will protect 1,000,000 acres of land farther down, and the impounded water, passing through power penstocks, will generate enough electric power to supply Tulsa, Springfield, and Little Rock with all the energy they are likely to need for the next 25 years.

Colonel G. E. Galloway of the Little Rock District of the Corps of Engineers, Department of the Army, is in general charge of the huge project, and it is for his agency the work is being done. The big dam, largest ever to be built in Arkansas and fifth largest of its type in the nation, will cost \$22,146,440 for the dam contract and \$9,447,100 for the supplementary aggregate contract.

So large is the dam that nine major contracting firms merged their interests in a joint venture to submit the low bids. The dam contractors are known as Ozark Dam Constructors. The concrete-aggregates firm calls itself Flippin Materials Co. Both contracts are held by the nine joint-venture firms. These firms are: Brown & Root, Inc., of Houston, Texas; Martin Wunderlich Co. of Jefferson City, Mo.; Peter Kiewit Sons Co. of Omaha, Nebr.; Winston Brothers Co. of Minneapolis, Minn.; Gordon Construction Co. of Denver, Colo.; Condon-Cunningham Co. of Omaha, Nebr.; Morrison-Knudsen Co., Inc., of Boise, Idaho; J. C. Maguire & Co., Los Angeles, Calif.; and Charles H. Tompkins Co., Washington, D. C.

By RAYMOND P. DAY,
Western Editor

Under the terms of the contracts, the firms will build the dam and appurtenances and supply the concrete aggregates. The Government will supply all cement, taintor gates, penstock gates and appurtenances, embedded lighting fixtures, and a few other such small items. The first cement contract for 270,000 barrels has been let to Universal Atlas Cement Co. of Independence, Kans.

Work began under the dam contract on June 10, 1947, and the contract allows 1,250 calendar days for the job to be finished.

A Concrete Man's Dream!

The job is a concrete man's dream. It will include just about everything that has previously been tried, and a few things which haven't. The concrete work will see the use of air-entraining agents and natural cement. It will demand the manufacture of every pound of sand and rock aggregate, and the placement of the mixed concrete at temperatures no less than 40 degrees and no more than 65 degrees. How will that be accomplished in the hot days of summer?

A new technique will be the answer: the aggregates will be chilled by immersion in 35-degree water; pea gravel will be cooled somewhat under shelter; the heat will be drawn out of the dry sand by big heat exchangers, around whose 327 3-inch I D tubes will circulate chill water at 35 degrees. Mixing water will hit the big mixers at a temperature of 35 degrees. Sand conveyors are to be totally enclosed, and the temperature held by a blast of 35-degree conditioned air through the duct. To handle the enormous refrigeration job, a plant is now being set up which is

(Continued on page 69)

Shortage of Steel Piles Forces Dam Contractors To Devise Mass-Concrete River-Diversion Barrier

WHEN laymen visited the Bull Shoals dam site in the early summer days of 1948, many were heard to exclaim, "Just look at that! They've got the dam almost finished!"

While layman ignorance of dam construction accounts in part for that remark, there is at least some logical reason for it. For Ozark Dam Constructors have now finished a massive concrete cofferdam enclosing an 18½-acre working area for the primary construction stage. Designed to pass a flow of 150,000 cfs without damage, the big barrier has pushed the White River far out of its normal channel towards the left-abutment bluff of the new dam. The structure is a miniature gravity-type concrete dam in itself, and has resulted in one of the driest working areas ever seen by many men on the job who have 10, 12, and more dams behind them.

The use of mass concrete was dictated by the current supply situation on steel sheet piles. A cellular type of steel cofferdam had been planned, but the steel piles were in such short supply that concrete was substituted.

The decision to build the strong cofferdam was further dictated by Corps of Engineers specifications. They called for a cofferdam which would pass a flow of 150,000 cfs and provide for topping the structure, without damage. If the contractors built such a barrier, then the Government would assume responsibility for any overflow damage to permanent dam works within the enclosure.

Cofferdam Design

The general rock elevation in the

CONCRETE	0000	0
STEEL PILES	0000	0
EMBEDDED METALS	0000	0
CONCRETE	0000	0
RAILROAD MAINT.	0000	0
PLANT ERECTION	0000	0
SALVAGE	0000	0
TRANSPORTATION	0000	0
PLANT EXCAVATION	0000	0
QUARRY	0000	0
BILL LIME	0000	0
PROCESSING	0000	0
TOTAL	20352	12

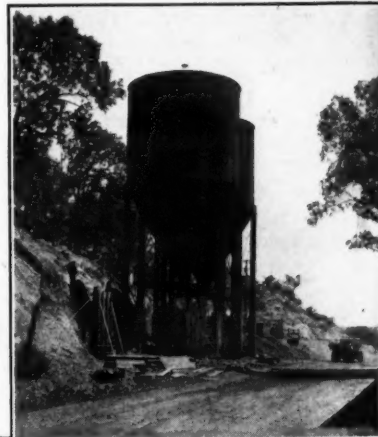
C. & E. M. Photo

Monthly safety scores at Bull Shoals Dam are shown by construction divisions on this safety score board. Ozark Dam Constructors is made up of nine major firms which merged their interests to submit low bids on this job.

vicinity of the cofferdam was 452 and plans called for the top elevation of the structure to reach 492. Thus a structure 40 feet high and about 1,580 feet long was required. The initial 18½-acre enclosed area is about 65 per cent of the area requirements of the whole project.

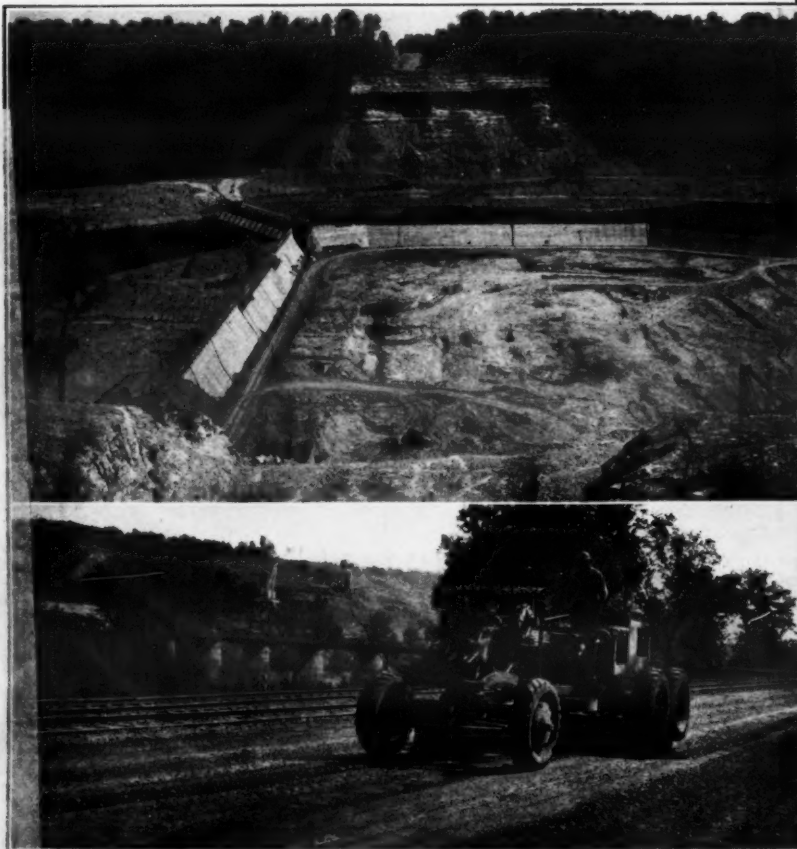
The cofferdam was built in a single monolithic section, without expansion joints. The upstream arm is 780 feet in length, and ties in with a river arm 800 feet long. The river arm parallels the channel, and since it has been built has had a few high stages of the river which were up against its sides.

(Continued on page 85)

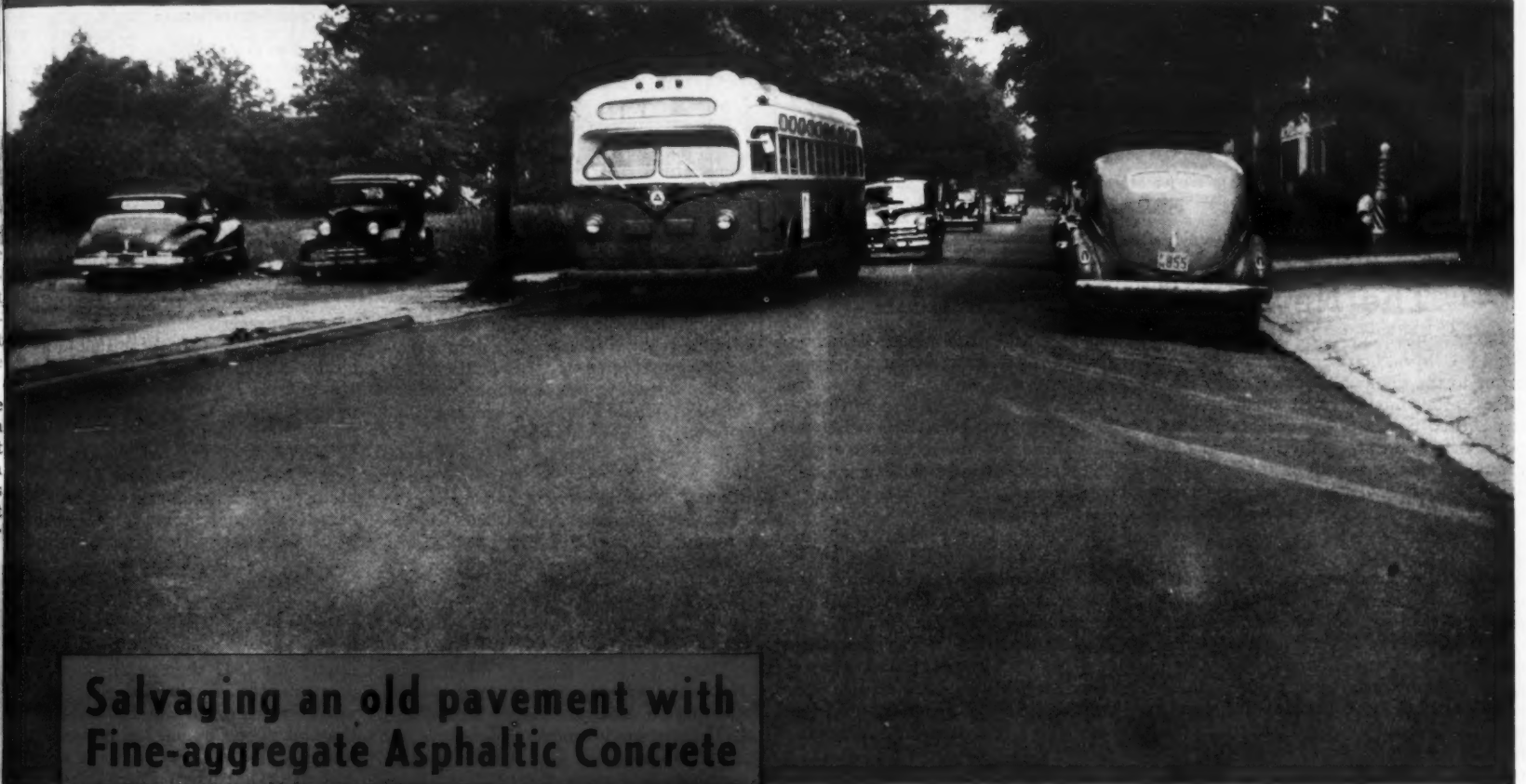


The two pictures below show the cofferdam and diversion structure at Bull Shoals Dam, and a Caterpillar No. 12 motor grader dressing an access road near the job railroad. (Project Superintendent Harvey Slocum is a bearcat for haul-road maintenance.) The pictures at right, top to bottom, show two big bulk-cement silos set up as part of preliminary operations; the central mixing plant formerly used at Friant Dam; and a 108-inch Armco Multi Plate pipe which will tap a big surge pit of raw aggregate and carry it to the crushers.

C. & E. M. Photos



An important New Jersey State-Aid project



Salvaging an old pavement with Fine-aggregate Asphaltic Concrete

Traffic on Union Avenue, Irvington, N.J., now enjoys the resilient, joint-free qualities of this newly completed Texaco Asphaltic Concrete pavement of the Fine-aggregate type.

Another worn, rough-riding pavement becomes a foundation for a resilient, heavy-duty Texaco Asphaltic Concrete wearing surface. For the principal north-south thoroughfare in Irvington, N. J., a Fine-aggregate Asphaltic Concrete, laid in two courses, with a combined thickness of three inches, was specified.

Years of experience on a large mileage of its streets and highways has sold the state of New Jersey on the durability, economy and lasting riding comfort of this pavement type.

Whatever your street, highway or airport surfacing problem, there is a Texaco Asphalt Cement, Cutback Asphalt or Slow-curing Asphaltic Oil exactly suited to your requirements. Every road builder should have on file copies of two helpful booklets which describe the wide range of road and street types constructed with Texaco Asphalt products. A request to our nearest office will bring you copies of these publications, which are offered without charge.



Laying and rolling the second course of Texaco Asphaltic Concrete on a State-Aid project in Irvington, N. J. The contractor was Thomas Gallo & Sons, Irvington.

THE TEXAS COMPANY, Asphalt Sales Dept., 135 East 42nd St., New York City 17

Boston 16

Chicago 4

Denver 1

Houston 1

Jacksonville 2

Philadelphia 2

Richmond 19

TEXACO ASPHALT



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For the Highway and Heavy-Construction Industry

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The New Outlook in Cement

Last month on July 9, the Federal Trade Commission's cease and desist order to the cement industry went into effect, after having been sustained by the United States Supreme Court. This now famous order compels the various companies in the cement industry to stop selling cement at a fixed uniform price throughout the country, without regard to varying transportation rates.

Hitherto, it made little difference whether the customer was one or 100 miles from the cement mill. He paid practically the same price for cement no matter where he was located. That situation no longer exists. Now the cement companies are selling their product either f.o.b. the shipping point, or at delivered prices which include full transportation costs from shipping point to destination. No longer may a company absorb a share of the freight charges in order to compete with a mill closer to the customer.

In other words, it was formerly no great concern to the cement user whether he patronized the local dealer or ordered his cement from far afield. He paid the same price in either case, with the more remote company absorbing the freight rate in order to meet the delivered price of the competitor. Now, by reason of the ruling of the highest court, freight rates are the controlling factor in the price of cement. The purchaser close to the mill will reap the advantage of his location, while the more distant user of cement will pay an amount in proportion to how far his goods must be shipped.

This ruling will call for some sharp changes in job estimating by the individual contractor. No longer can he skip quickly over the unit price of cement in his bid for a contract. On the contrary, he must carefully analyze the sources of cement supply, and he must have more than just a casual understanding of shipping charges. The two factors of f.o.b. the shipping point and railroad freight rates may well represent to him the difference between profit and loss.

As for the long-range effects of this new ruling on the construction industry as a whole, it is still too early to foresee them. While some consumers will pay more for cement than they have in the past, other will be charged less or about the same. Most economists feel that the average price of cement over the whole country will be roughly the same. Thus overall construction costs should not be appreciably affected under this new set-up.

The cement industry, on the other hand, will be profoundly affected. It has opposed this order of the Federal Trade Commission, feeling that it was economically unsound and wrong. Now that it must comply, it may find that some of its mills are poorly located with respect to the market, and that production at such places may have

to be reduced. Also, badly managed mills will no longer be carried by the others, but will have to stand on their own feet. The need for cement in some regions may well be so great that new mills will have to be constructed.

The court's ruling with respect to price fixing in the cement industry raises the old problem of where to draw the line in modern industrial society between competitive and monopolistic practices and organization.

The most classic decision on that issue was probably the Supreme Court's ruling in 1935 that the National Recovery Administration (NRA), created by the President, was unconstitutional—on the grounds that it restricted competition by limiting or apportioning output and abolishing price cutting. The abolition was generally regarded at the time as a great blow to both industry and labor, for NRA codes had contained many special privileges to both groups. But to the consumer, who is numbered not only in labor and industry, but in the ranks of the entire nation, its demise was really a boon.

Whatever the outlook for the cement industry under the present ruling, it may be well to remember that what helps the consumer generally benefits the entire nation. And there are few in this country who are not, indirectly at least, cement consumers, enjoying the great works of construction for which this product is responsible.

Construction Institute Aims to Simplify Spex

An organization dedicated to the improvement of specification writing and practices in the construction and allied industries has been launched in Washington, D. C. It is known as The Construction Specifications Institute, Inc., and is located at 1825 K St. N. W., Washington 6, D. C. Membership is composed of specification writers, architects, and engineers employed in both private and public practice.

The purpose of the Institute will be to compile and analyze statistics and information; to engage in the research and study of new methods and all problems dealing with specification writing; and to establish and maintain a clearing-house of technical information on specifications for the fabrication and installation of construction materials and equipment.

When members are enrolled, they are asked to submit typical project specifications which they have prepared and which are suitable for publication. Anyone who applies to the Institute for special specification assistance at a fee will be referred to members qualified to assist in that particular field.

Among the goals set by the organization are: better specification writing; simpler specifications; standardization of building codes; standardized specifications for public works by the government at all levels; and study of new materials and processes.

ASTM 51st Convention

The American Society for Testing Materials recently held its 51st annual meeting in Detroit, Mich. More than 1,775 members attended. There were 19 technical sessions and 350 committee meetings, and more than 135 technical papers were presented.

An extensive symposium at the meeting was concerned with mineral aggregates. It covered improvements in this field in the last 20 years, and stressed the importance of this material in construction. Fourteen papers were presented by leading authorities.

Another highlight of the meeting was the symposium on reactive materials in concrete, at which several papers were presented describing the means that have been set up to identify potentially reactive materials.

The winner of the Sanford E. Thompson Award was announced: W. C.

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Hanna, Chief Chemist of the California Portland Cement Co., for his paper on "Unfavorable Chemical Reactions of Aggregates in Concrete and a Suggested Corrective".

New officers elected for 1948-1949 include: Richard L. Templin, Assistant Director of Research and Chief Engineer of Tests, Aluminum Co. of America, to the position of President, and L. J. Markwardt, Assistant Director, U. S. Forest Products Laboratory, Madison, Wis., as Vice President to serve with the Senior Vice President. T. A. Boyd, Past President, continues on the Board of Directors

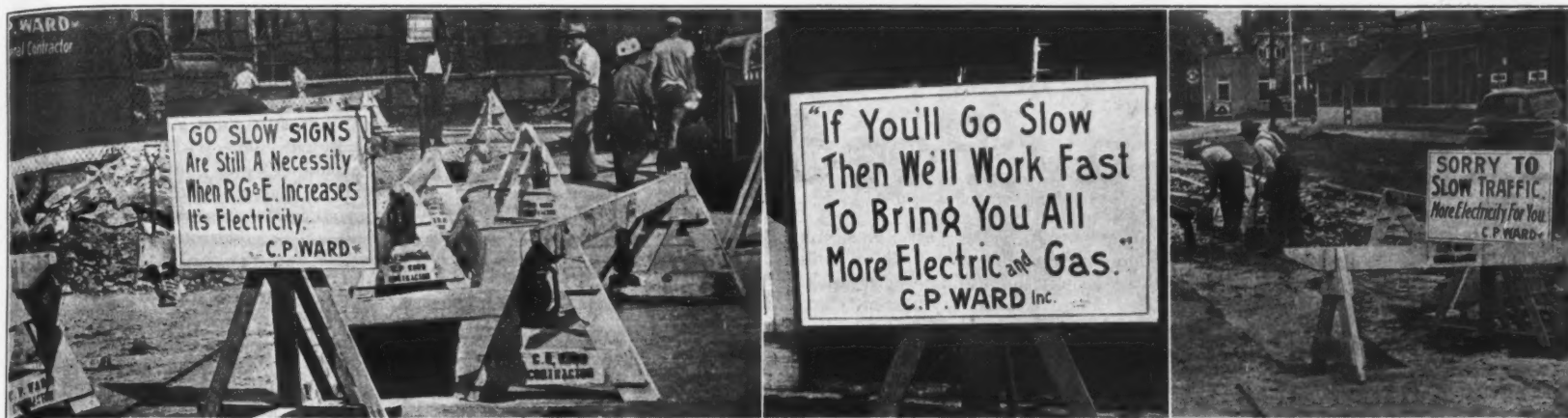
Safety Figures for 1947

The safety record of American industry for 1947 showed an overall improvement over that of the previous year, according to the National Safety Council. The Council has released preliminary figures in advance of the 1948 edition of "Accident Facts", its annual statistical yearbook.

The accident-frequency rate for all industries submitting company reports to the Council, based on the number of disabling injuries per 1,000,000 man-hours, was 13.26—a reduction of 10 per cent from the 1946 figure. In the construction industry, the accident-frequency figure is 24.14. This puts construction ninth from the bottom in a list of 40 industries. The accident-severity rate, based on the number of days lost per 1,000 man-hours, was 1.23 for all industries, and 2.64—seventh from the bottom—for the construction field.

THE 1948 ROAD SHOW—HOW IT LOOKED FROM THE AIR





These safety signs in verse have cut public liability claims 70 per cent for general contractor C. P. Ward of Rochester, N. Y. Motorists chuckle instead of cuss when a Ward sign suggests that they slow down and tells them why.

Verse Safety Signs Slow Up Job Traffic

General contractor C. P. Ward of Rochester, N.Y., once used the conventional work-in-progress sign when he was installing gas, electric, or steam lines in city streets. "Construction. Slow Down", he used to command the public traveling through his job.

Then one day he had an idea. He wouldn't command; he would intrigue. He'd make the traffic-snarled motorist chuckle instead of cuss by offering him a roadside poem: "This Project Ahead Will Slow You Down, But It's More Electricity for Our Town". And a little farther down the line, "Another Delay, Bear It and Grin, Speed Is Out Till the Gas Line's In".

The public loved it. It loved being told what the job was all about; it loved being told in verses. And it had to slow down in order to read them. For unlike the Burma Shave signs which are staggered so the motorist doing 50 or 60 mph can still read them, Ward's signs are designed specifically to slow down traffic. Motorists smiled. Public liability claims dropped 70 per cent. And other contractors soon began copying Ward's poetic pleas for safety.

Ward now offers his personnel \$10 for each new safety slogan which is accepted, and to date he has accepted more than fifty. It's a good deal for the boss, and it's a good deal for the employee who can come up with, "Trenches and Barricades, What Does It Mean? The R. G. & E. Is Increasing Its Steam".

"Connie" Ward has gone into the sign business for sure, and now keeps a large array of colorful, "poetic" traffic signs stored in a shed against the next job.

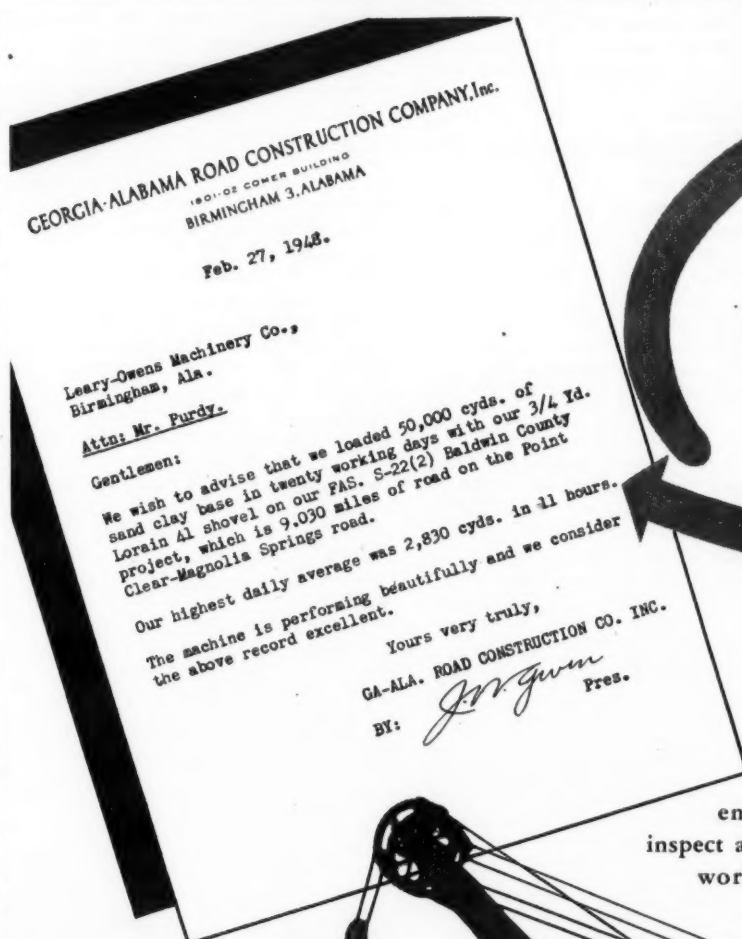
Bibliography Published On Planning-Survey Data

An annotated and indexed bibliography on the uses which have been made of planning data obtained by state-wide planning surveys has been issued by the Highway Research Board of the National Research Council. It was prepared by the Joint Committee on Uses of Highway Planning Survey Data, and is designed to aid in obtaining the most effective use of the data which so far have been accumulated.

The bibliography is arranged alphabetically according to the author or source of the information and according to states. After each name, there is a short discussion of the subject matter covered in the reference, and mention of where it is to be found. A complete index is included to aid in the use of this bibliography.

Copies can be obtained by writing to the Board's publication offices at 2101 Constitution Ave. N.W., Washington 25, D. C. Cost of the pamphlet is 30 cents.

Motor-vehicle travel in the U.S. is steadily increasing, the PRA reports. Figures for May, 1948, indicate an average increase in vehicle-miles of 7 per cent over May, 1947, and 15 per cent



GEORGIA-ALABAMA ROAD CONSTRUCTION COMPANY, Inc.
1801-02 COWER BUILDING
BIRMINGHAM 3, ALABAMA
Feb. 27, 1948.

Leary-Owens Machinery Co.,
Birmingham, Ala.
Attn: Mr. Purdy.

Gentlemen:

We wish to advise that we loaded 50,000 cyds. of sand clay base in twenty working days with our 3/4 Yd. Lorain 41 shovel on our FAS. S-22(2) Baldwin County project, which is 9.030 miles of road on the Point Clear-Magnolia Springs road.

Our highest daily average was 2,830 cyds. in 11 hours. The machine is performing beautifully and we consider the above record excellent.

Yours very truly,
GA-ALA. ROAD CONSTRUCTION CO. INC.
BY: *J. M. Gwyn* Pres.

**3/4 YD. LORAIN-41
HANDLES 2830 YDS.
IN 11 hours**

● A one-day record, sure—but take a look the record for handling 50,000 yds. An average 2500 yds. per day over a 20-day period! For 3/4 yd. machine, that's really dishin' dirt in a kind of digging.

This owner's letter is reproduced in entirety for your inspection—but the real place inspect a Lorain 41 is in the field where you can judge the working features of this dynamic 3/4 yd. machine for yourself. Ask your local Thew-Lorain distributor to arrange a visit to some nearby jobs so

THE THEW SHOVEL CO., Lorain, OH

Thew
Lorain 41

Fast-Moving Crew Paves Expressway; Feeder Roads

Huge Concrete-Slab Job Requires Equipment of Various Widths as Wide Strips Are Poured

♦ CONCRETE paving on the new Houston Urban Expressway (see C. & E. M., July, 1948, pp. 6, 76, and 77) has been one of the biggest items under way this season by Brown & Root, Inc., under its \$6,000,000 contract with the Texas Highway Department. Double 37-foot roadways were laid for a distance of 13,200 feet across the first part of the downtown area. A service road 32 feet wide inside curbs, 33 feet outside, was placed on each side of the Expressway all along this route except at the overpasses. Various transitions and access ways increase the amount of concrete pavement.

The job called for a uniform 8-inch-thick Class A concrete slab. This concrete is reinforced with wire mesh, placed halfway down in the slab. With five overpasses and innumerable transitions to consider, many of which required hand finishing, the job proceeded on schedule none the less, due chiefly to an excellent organization, good equipment, and cooperation on the part of state and contractor's men.

The off-standard width of the expressway lanes made it necessary to alter most of the concrete-placing and finishing machines. Both these slabs had to be made in two pours because of their extreme width.

From the contractor's viewpoint, of course, it would have been desirable to split the lanes in two equal parts. But this scheme was not acceptable to the State, because of the traffic-stripe

requirement. In Texas pavements, the 6-inch black traffic stripe covers and obliterates any longitudinal-joint crack.

The main expressway lanes were therefore divided into two strips, 12 feet 3 inches and 24 feet 9 inches wide. The wider of these two lanes on both roadways lies adjacent to the 3-foot strip which separates traffic on the expressway.

Service roads are divided into two strips of 12 feet 6 inches and 20 feet 6 inches. An old Ord finishing machine was purchased and cut down to smaller dimensions for use on narrow strips. The main spreading and finishing machines were adjusted to 24 feet 9 inches for expressway pours, and then cut down to 20 feet 6 inches for use when pavement was laid on the service roads. Paving was done progressively, but according to a master plan which made these change-overs as infrequent as possible.

One other unusual feature of this work was the use of a LeTourneau C-10 Tournapull with a LeTourneau 15-ton crane to move the paving equipment. As each lane was finished, this machine picked up the Jaeger-Lakewood spreader, a Koehring Longitudinal Finisher, the striping machine, and various other small equipment, and transported them to the next set-up.

The concrete pavement was scheduled to be finished and ready for use by August 15, 1948. Slow deliveries on steel structural members may cause some delay, however, on the overpasses.

Preparing to Pave

Concrete paving on this project was
(Continued on page 89)

In photo 1, wood expansion joints on the Houston Expressway are aligned according to a string line across the tops of the Blaw-Knox forms. 2 is a view of concrete-finishing equipment. 3. Workmen build curb with steel forms clamped to the highway forms. And 4, a traffic-striping machine lays a permanent iron-oxide marker stripe. C. & E. M. Photos

Hot Asphaltic Concrete Levels, Then Surfaces Main Feeder Streets on Big Houston Expressway

♦ ENGINEERS on Houston's Urban Expressway agree that, to the public, one of the first tests of the big project will be the smoothness and "rideability" of the four feeder streets which take traffic off and onto the expressway near the northwest end of the project.

There, at that important terminus, about 68 city blocks of Pease, Jefferson, Calhoun, and Pierce Streets were widened to 54 feet with concrete, then leveled and topped with hot-mix asphaltic concrete. Covering about 1.06 miles, this new asphalt-resurfacing work amounted to approximately \$100,000 in the Brown & Root, Inc., prime contract with the Texas Highway Department.

Of the total job, 20 city blocks near the northwest end were laid on new sub-base, over an area where the streets previously had not been surfaced. In general, however, the smooth-riding surface desired on these feeder streets was achieved only after a battle with practical difficulties. The old pavement, laid from 1922 to 1940, was generally beaten to pieces and uneven. Up to three 2-inch leveling courses were laid to get the street level and ready to surface. Sub-bases of varying densities had to be taken into consideration, and extensive raking at the intersections to get proper drainage held progress to about 500 tons per 9-hour day.

Despite these difficulties, the asphaltic-concrete work which began on November 28, 1947, was finished in February. Rain and other unfavorable paving weather hampered the job throughout the winter.

Not a small part of Brown & Root's enviable reputation grew from various asphaltic-paving projects on highways and airfields, as well as smaller installations, throughout the south. Some of the hot-mix plant superintendents and laydown men with this firm have carried on for 20 years and more. It was this caliber of technician who worked on the Houston Expressway paving job.

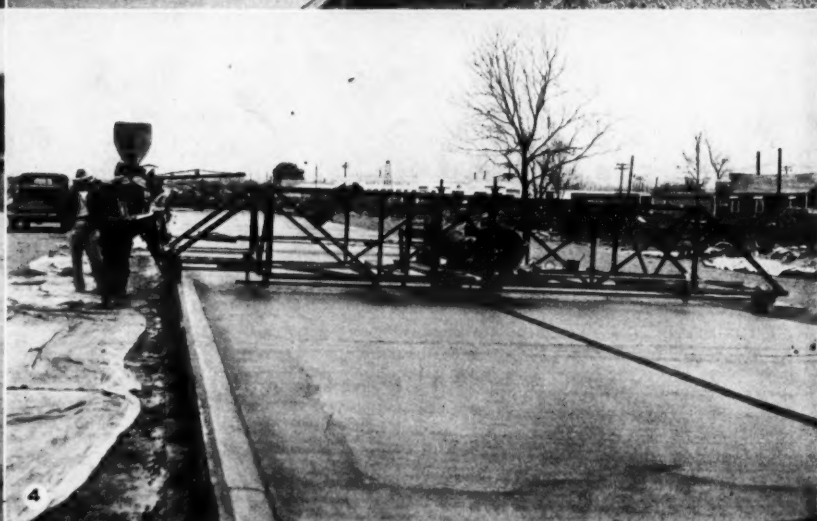
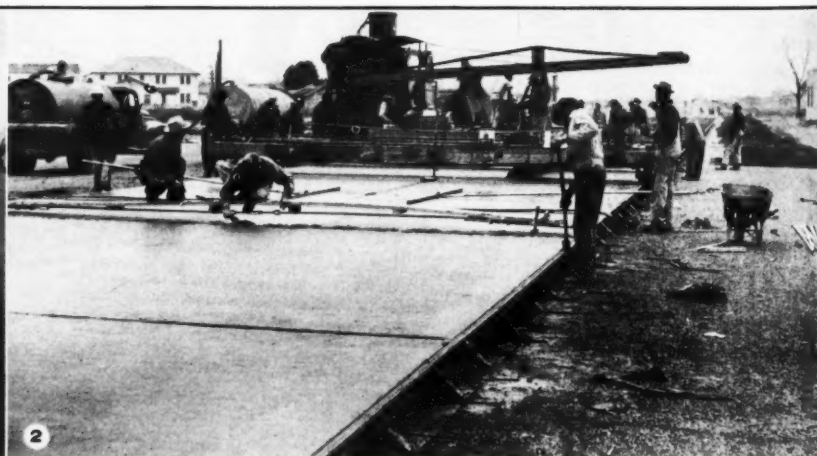
Asphalt-Plant Set-Up

For some years, Brown & Root, Inc. has batched hot-mix asphaltic concrete from its permanent plant about 2 miles east of the downtown section of Houston. Paving materials from this plant serve the area in a 40-mile radius, often going down as far as Baytown. Uncovered loads make this long trip with the loss of only about 15 degrees of temperature, according to General Paving Superintendent A. J. Mundy, Jr., who directed the Houston asphaltic paving.

The 4,000-pound plant will handle about 750 tons per 8-hour day if the job proceeds as fast as the plant can work. Extensive raking and care on the Expressway project cut this figure to about 500 tons per day top performance. The plant consists of a Standard 4,000-pound pugmill and elevators, a Simplicity drier, with a set of Symons screens.

Crushed limestone from the Serv-Tex Materials Co. at New Braunfels, Texas, was used for coarse aggregate. New Braunfels is about 200 miles west of Houston, and the material was shipped by rail over the Missouri Pacific Railroad. The limestone had a Los Angeles rattle-test rating of 35, at 500 revolutions.

This material was hauled in on a railroad spur which serves the plant, and stockpiled near the feeder hopper by a 3/4-yard Lorain clamshell. Often during peak paving operations a larger clamshell had to be used. The limestone was combined with two varieties of sand to make the aggregate mix. A local type of fine aggregate known as "red sand" was used, and fine bank sand from a deposit adjacent to the plant was mixed in. About 2 per cent of
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oyster-shell dust was also added, to bring up the minus-200 fines.

Brown & Root used Texaco asphalt-cement with a penetration factor of 90 in the hot-mix. The asphalt was shipped in railroad tank cars, of 8,000 to 10,000-gallon capacity, from the Texas Co. refinery at Port Neches, and spotted on a railroad spur at the plant yard. It was usually loaded at the refinery at a temperature of 300 degrees, and after a 2 to 4-day trip was cooled down considerably.

A steam line from the central boiler at the plant heated the cars, and the liquid asphalt was then transferred to storage. A main steam pump can transfer asphalt from cars to any of the storage tanks, or directly to the 3,000-gallon hot well at the plant.

Asphalt storage facilities include a 9,000-gallon and a 15,000-gallon horizontal storage tank near the railroad spur; a 15,000-gallon storage tank near the plant; and the 3,000-gallon hot well. The railroad spur is about 275 feet from the pugmill, and steam lines run that distance in a common jacket with the asphalt lines.

The hot asphalt at the hot well is circulated in a continuous loop by another 2-inch asphalt pump. This pump serves no other function.

This plant has no storage facilities for fuel oil, since the boiler and drier burners are fired with natural gas. The boiler is a horizontal locomotive-type water-tube steam generator, rated at 80 hp. Steam from this boiler heats all asphalt storage tanks, operates all the asphalt pumps, and actuates the pugmill door.

The drier is a Simplicity Model S-75, and the plant generally is driven by electric motors. A central control house has been set up where all the Cutler-Hammer push-button controls are located on a main board. These include start-stop devices for the shaker screens, the hot elevator, the dust-collector fan, the drier, the pugmill, and the dust elevator.

Movement of Materials

Aggregates and sand from the stockpiles along the railroad track are clammed to a feeder hopper by the Lorain crane. Twin belt feeds then move the material to the cold-stone elevator, which carries it up to the 75-ton-capacity Simplicity drier. This dual-drum revolving drier removes all moisture from the material by heating it to a temperature of about 375 degrees.

From the drier, the aggregates pass through a chute to the hot elevator, which raises the material up to the top deck of a set of Symons shaker screens. When the plant was visited, leveling-course mix was being run, and four decks of screens were on the frames. No. 1 bin had a 1/8-inch screen; No. 2 bin a 3/8-inch mesh; No. 3 bin's screen had 3/4-inch openings; and No. 4 bin carried a 1 1/4-inch mesh screen.

After being classified to proper bins, the aggregate then passes to the weigh box and pugmill. Aggregate temperatures are constantly recorded on an automatic chart near the control house, by means of a pyrometer and thermocouple located in the hot-elevator stack.

Hot asphalt, circulating in a continuous loop, is available for the batch near the pugmill, simply by opening a valve. The aggregates are weighed on a beam scale with progressive weighing, and asphalt is weighed out on dial scales. The 2 per cent of shell dust came up a bucket elevator from a storage shed near-by, and fed directly to the weigh boxes. The materials were mixed 45 seconds in the pugmill.

The Mix

The mix was designed after extensive tests and trials. A recent breakdown of the various mixes showed the following percentages of materials:

For Type B Leveling-Course Material:	
Size of Aggregate	Per Cent of Weight
Plus 1-inch	0
1 to 3/4-inch	31.7
3/4 to 1/2-inch	15.2
1/2 to No. 10	11.2
Total, plus 10 material	58.1
No. 10 to No. 40	9.2
No. 40 to No. 80	17.8
No. 80 to No. 200	7.4
Pass 200	1.3
Asphaltic cement, 90-penetration	4.2
For Type D Fine-Mix Surface Course:	
Plus 3/4-inch	0
Plus 3/8-inch	0.5
3/8 to 1/2-inch	14.0
1/2 to 3/4-inch	18.4
3/4 to No. 10	22.8
Total, plus #10 material	55.7
No. 10 to No. 40	9.6
No. 40 to No. 80	10.9
No. 80 to No. 200	14.1
Pass 200	4.9
Asphaltic cement, 90-penetration	4.8

Laboratory tests run by the Texas Highway Department on this material gave average field densities of from 95 to 98 per cent, and average Hveem stability readings of plus 50. State specifications required minimum stability-



C. & E. M. Photo

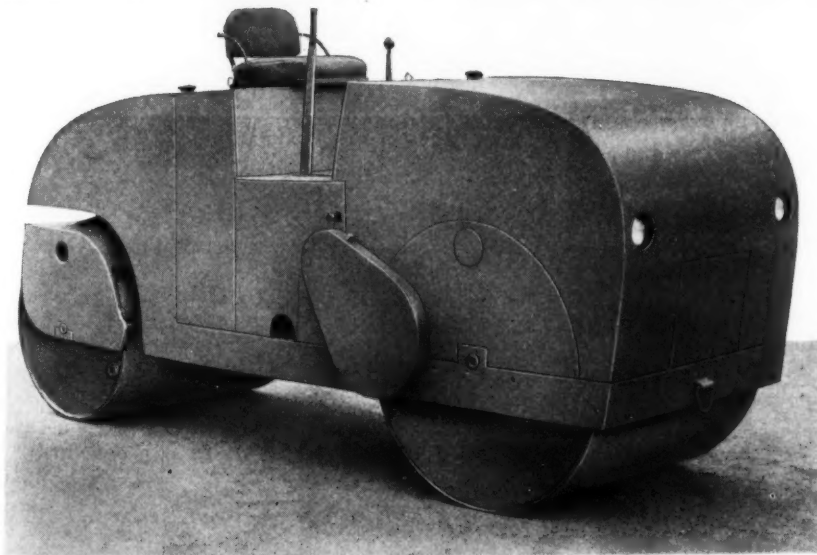
Here is Brown & Root's permanent asphalt-plant set-up about 2 miles east of the Houston downtown section. It consists of a Standard 4,000-pound pugmill and elevators, a Simplicity drier, with a set of Symons screens.

test results of plus 45. Some of the old pavement, tested where shoving had occurred, gave readings as low as 27. The asphalt content on these sections

was abnormally high, where enthusiastic if ineffective maintenance work had been done in the past.

(Continued on next page)

Sealcoat TANDDEM ROLLER



Right side view of the new SEALCOAT TANDDEM ROLLER. The seat location allows the operator to see the work in all directions. This, with the conveniently located right-hand clutch lever and the left-hand ball top hydraulic steering lever, permits of easy handling whether working in the open or in corners and confined spaces.

Handles all asphalt, gravel or other rough surface jobs with remarkable ease at money-making speed. Works in corners, confined spaces and maneuvers easily in small areas with short 91" wheel base. With but 1 1/2" of frame extension on left side it can work WITHIN 2 INCHES from buildings, fences, etc. To eliminate hand finishing, has 13 3/4" ground clearance to allow hair-line finishing when working along curbs and other raised side obstructions. SINGLE LEVER HYDRAULIC STEERING permits fast, tireless handling. Geared bull wheel provides positive power transmission and allows faster starts and stops. Other features: Foot operated Parking and Service Brake, Electric Starter, Turns in 12' circle, Low center of gravity, Free access to working parts, Easily transported, etc.

FOR IMMEDIATE DELIVERY WHEELER TANDDEM ROLLER

SINGLE LEVER HYDRAULIC STEERING AND
ELECTRIC STARTER

This widely used 3 to 4 TON VARIABLE WEIGHT ROLLER is essentially the same in its sturdy construction and major operating features as the SEALCOAT Roller (above). Power specifications are identical. It is basically different in design and other minor specification differences given below.

MAJOR SPECIFICATIONS

DIMENSIONS: Wheel Base 7'10"; length overall 10'7"; width overall 3'6". Tank height 4'10". Ground clearance 10". Left side clearance 1 1/2".
WEIGHTS: Shipping weight (approximately) 5500 lbs. Maximum weight (with ballast) 8000 lbs. Extra metal weight 400 lbs.
COMPRESSION: Per Lineal Inch: Compaction roller, 150 lbs. with ballast. Steering roller 70 lbs. with ballast.
ROLLERS: COMPACTION—Width—36". Diameter—37". Rolled from 1/8" stock.
STEERING—Width—34". Diameter—27". Rolled from 3/4" stock.

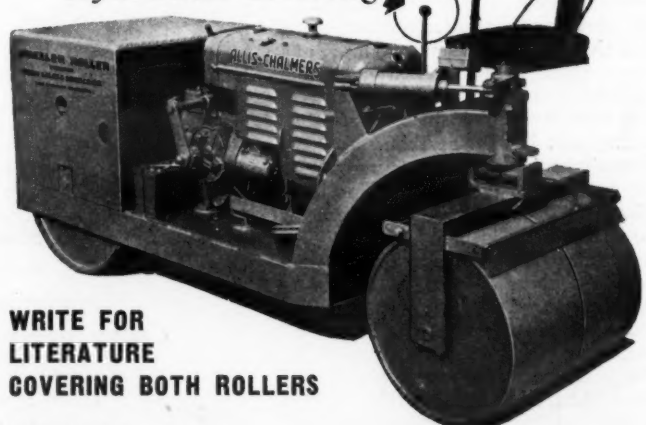
TIMKEN BEARING EQUIPPED THROUGHOUT

ASK ABOUT CHOICE DEALER TERRITORY AVAILABLE

MAJOR SPECIFICATIONS

POWER: Allis-Chalmers Industrial Model B. 24.5 Brake Horsepower @ 1500 RPM; 27.8 Brake Horsepower @ 1800 RPM. Speeds: 2 forward and 2 reverse give 1.55 to 4 MPH range in either direction.
DIMENSIONS: Wheel Base 91". Length overall—132". Width overall—43". Tank height—57". Ground clearance—13 3/4". Left side clearance—1 1/2". Right side clearance—3 1/2".
ROLLERS: COMPACTION—Width—38". Diameter—40". Rolled and machined from 7/8" stock.
STEERING—Width—38". Diameter—30". Rolled and machined from 3/4" stock.
COMPRESSION: Per lineal inch: Compaction Roller—155 lbs. with ballast. Steering roller—75 lbs. with ballast.
WEIGHTS: Shipping weight (approximately) 6500 lbs. Maximum weight (with ballast) 10,000 lbs. Extra metal weight—600 lbs.

Hydraulic Steering



WRITE FOR
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Manufactured by

SHAW SALES AND SERVICE CO.

5100 Anaheim-Telegraph Road

Phone Angelus 1-7141

Los Angeles 22, California

Asphaltic Concrete For Feeder Streets

(Continued from preceding page)

The batched material was loaded from the plant directly to dump trucks, which hauled the material on a batch basis to the job. Some of the trucks hauled three 4,000-pound batches; a few others could take four.

Placing the Hot-Mix

Meanwhile, the widened sections had been stabilized by heavy rolling, which developed 100 per cent of Proctor density in the subgrade. Then they received 9 inches of sand-shell sub-base in two to three lifts, also thoroughly rolled. About 30 per cent of sand was added to this shell material, and it was mixed through a pugmill at Parker Brothers commercial plant in Houston.

This base was then primed by shooting 0.3 gallon of OA-175 per square yard through an Etnyre pressure distributor, at a temperature of 320 degrees minimum. The spray bar of the distributor covered widths up to 24 feet. The sub-base was primed as rapidly as it could be developed, and the asphalt was covered with a light blot coat of 3/8-inch-minus material, spread at the rate of a cubic yard to 200 square yards. This cover material was rolled by pneumatic rollers, and ordinarily cured about 30 to 60 days ahead of paving. Traffic was permitted on this sealed sub-base, since at that stage it closely approximated much of the light-travel highway building farther out in the western part of the state. No damage resulted from traffic.

A Barber-Greene Tamping-Leveling Finisher received the hot-mix material and laid it down on the streets. The lowest places were filled first, until the old pavement and widened sections were level. The coarse-mix leveling-course material went in there. Irregularities were many, and there was much patching to do before the streets were leveled.

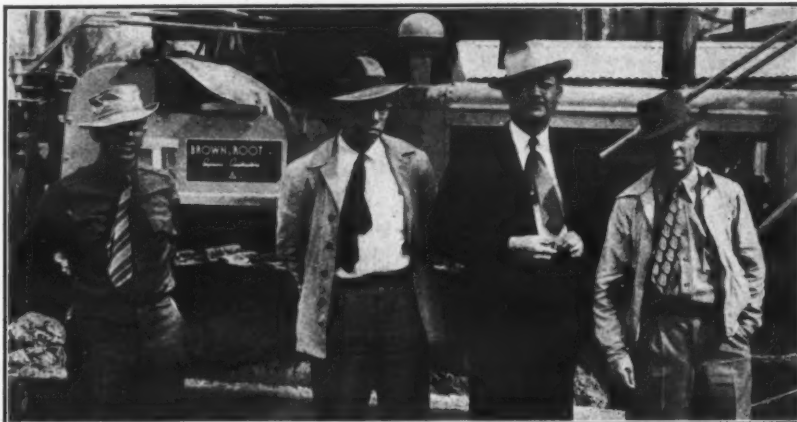
The laydown crew consisted of a foreman, an operator on the Barber-Greene machine, a rear-screed tender, 3 rakers, and 3 shovelers. One of the shovelmen also acted as truck spotter. There were also 3 roller operators.

Where possible on the leveling courses, and always on the riding course, the hot-mix was laid down first from one of the curb lines. Leaving a gutter lip at this point, the 10-foot-wide machine placed its 2 1/4-inch lift of material in a straight line, matching that line as it worked across the street.

Brown & Root, Inc., has a Paving Superintendent by the name of W. D. Duffy in general charge of field work, who uses an efficient theory in connection with longitudinal strip joints. Instead of raking these joints and bringing large rock on them, Duffy's men use brooms with just the reverse effect in mind. They remove the bigger particles and leave more fines on the joint. These joints are then rolled immediately behind the Barber-Greene machine, at a temperature of about 300 degrees, by a 10-ton 3-wheel Huber roller. Later rolling then irons them in so perfectly that they can hardly be seen.

Extensive raking was of course necessary on some of the intersections, but the Barber-Greene machine performed quite successfully in many of the tight turns and other restricted corners. Developing about 80 per cent of the initial compaction of the pavement with its tamping bars, this machine left the material about 2 1/4 inches thick.

The joints and edges were given one pass of the roller immediately. When the material had cooled to approximately 250 degrees F, the 3-wheel Huber roller began to compact the strips. It was followed by an 8-ton Huber tandem machine. Farther back, another 8-ton Huber tandem roller secured the final compaction.



C. & E. M. Photo

Left to right: Frank Geron, Chief Inspector on asphalt paving for the Texas Highway Department; A. J. Mundy, Jr., Manager of Asphalt Paving for Brown & Root; T. M. Delk, Resident Engineer; and Howard Payne, General Superintendent for Brown & Root.

The final rolling was done at a street angle of 45 degrees, to obliterate the joints completely, to bring the pavement surface to velvet-smooth finish, and to eliminate the mottled appear-

ance which sometimes follows a straight, longitudinally rolled job. Another decidedly important factor in the smooth job secured was the fact that all leveling-course material was placed and

checked carefully before the final 2-inch surface course was laid.

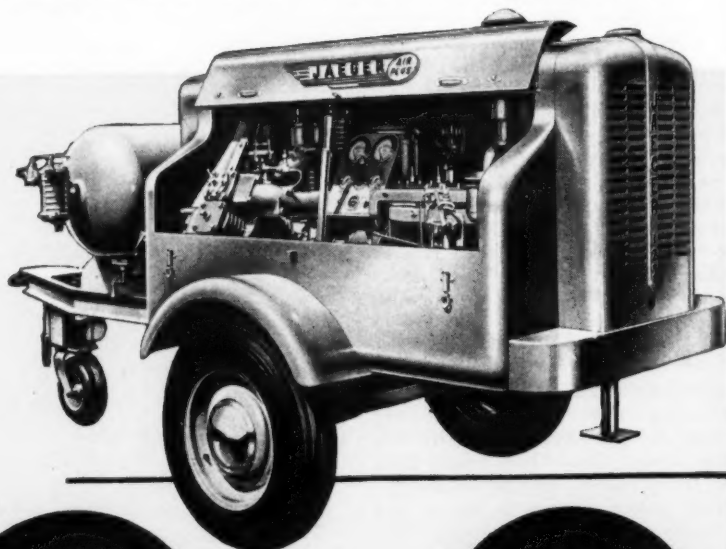
At the end of a day's work, the joints were raked down to a feather edge, and the roller worked down over this lip to the lower level. Next day, this feather edge was cut back to a vertical joint of full thickness, using mattocks or axes. Sometimes as much as 24 inches was taken away to get the fine vertical joint required.

Public Gives Early Approval

As if to give some indication of its approval, the public was quick to use these streets as soon as many of them were finished. The synchronized street signals, designed and installed by Texas Highway Department engineers, had been turned over to the City for operation, and taxicab and truck drivers soon learned they could run the length of the downtown section on the wave of lights. If they maintained the signal speed of 28 mph, they could cover ground in a short time, with driving

(Concluded on next page)

"New Standard" 125 Ft. Compressor does yet sells at old 105 Ft. price...



These "New Standard" Air-Plus Compressors deliver more air to run more tools at full 90 lbs. pressure, yet cost no more than obsolete "old standard" sizes:

model
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runs a heavy breaker, 2 light breakers or 3 tampers at 90 lbs. pressure — which a model 60 can't do.

model
185
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runs 3 heavy breakers or medium rock drills at 90 lbs. pressure — which a model 160 can't do.

model
250
cfm

runs 4 heavy breakers, 2 heavy drills or medium wagon drill at 90 lbs. pressure — which a model 210 can't do.

model
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runs a heavy wagon drill plus rock drill or heavy breaker at 90 lbs. pressure — which a model 315 can't do.

for latest labor-saving, mass-production equipment—see your Jaeger distributor



TYPE "X" DIAGONAL SCREED FINISHER — lays flush to high form on pitched slab and super-elevated curves, saves 1 to 2 shovelers; finishes smoother, faster behind today's mass-production pavers.



REMIXING, COMPACTING CONCRETE SPREADER — increased capacity and flexibility in an improved design. Exclusive screw action positively eliminates segregation, produces denser, more uniform, longer-lasting slab.



MODEL BP-5 BITUMINOUS PAVER — instant width adjustability 8 to 12 1/2 ft., high speed oscillating compaction and finishing; burn-proof screed heating; straightedge surface equalizing; oil traction on subgrade.

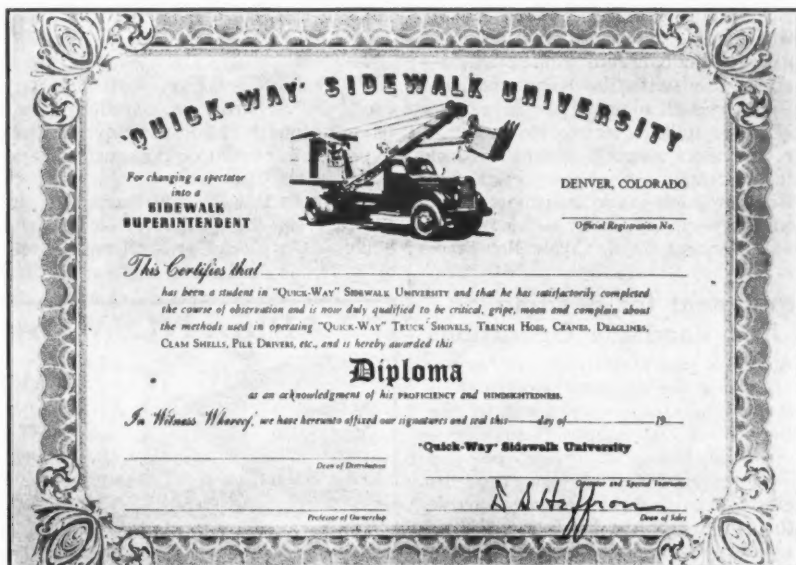
ease, and with no stops.

Personnel

The hot-mix asphaltic-concrete paving under the Brown & Root contract, totaling about 12,000 tons, was under the general supervision of A. J. Mundy, Jr., Manager of Asphalt Paving for Brown & Root. W. D. Duffy was the Field Superintendent, and Frank Geron was the Chief Inspector on asphalt paving for the Texas Highway Department. F. M. Delk was Resident Engineer for the State on the entire Brown & Root contract. He is a long-term hand of the Texas Highway Department.

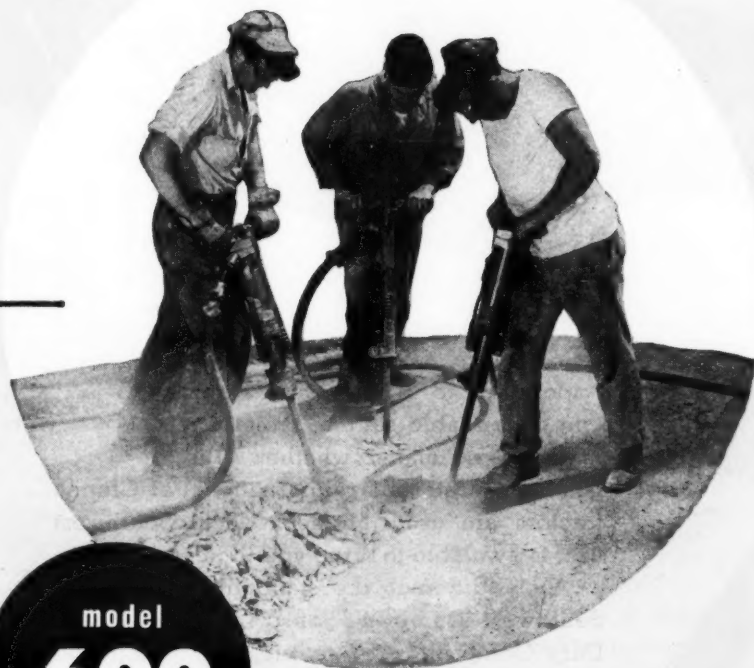
Sidewalk Superintendents To Receive Recognition

That paragon of construction information—the man on the sidelines who knows so much more than the man on the job—is about to receive the recognition due him. Through the Sidewalk University of "Quick-Way" Truck Shovel Co., he will now be granted a



Surely the most coveted of all diplomas, this one—certifying that its owner is a graduate of an accredited Sidewalk University, and is now a full-fledged Sidewalk Superintendent. "Quick-Way" Truck Shovel Co. is the new founder and educator.

**40% more work,
All Jaeger's new sizes are comparable!**



125 cfm of air runs 2 big breakers or 3 medium duty breakers at full 90 lbs. pressure, doing 40% more work than you can do with weak 70 lbs. pressure from 105 ft. of air.

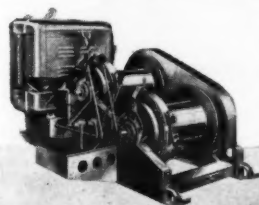
Costs no more than old "single-breaker" 105 ft. compressors, weighs no more, and does not use an ounce more fuel when its additional air capacity is not required.

model
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The JAEGER
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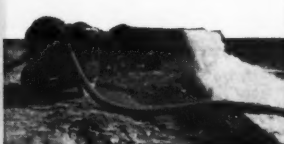
runs 2 heavy wagon drills plus heavy rock drill at 90 lbs. pressure — which a model 500 can't do.



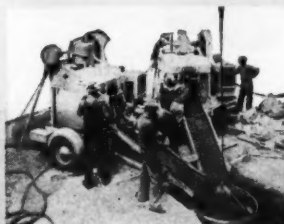
3-SPEED, ALL-STEEL HYDRO-HOISTS
Automotive transmission with instant shift from "Low" to "High" for speed with lighter loads. Finger-touch hydraulic control. Interchangeable gas, electric, diesel.



TRUCK PAVERS WITH CONCRETE SPREADERS
The modern, flexible paving plant that pours half-width slab without detouring traffic, plus widening work, curb, gutter and all concrete structures.



DEWATERING AND PRESSURE PUMPS
Famous "Sure Prime" high efficiency, low head pumps for drainage work, 1½ to 10" sizes. Higher head models from 2" to 8" for water supply, jetting, etc.



CONCRETE, PLASTER, BITUMINOUS MIXERS
3½S and discharge tilts and non-tilt "Auto Loaders". Power loaders from 65 to 165. "Power Hoe" plaster mixers. Portable "cold mix" plants.

degree and diploma elevating him from a lowly spectator to a dignified Sidewalk Superintendent.

"Graduates" of the University will be cited for their "proficiency and hindsightness" and will be duly qualified "to be critical, gripe, moan, and complain about the methods used," etc. In addition to the diploma which they can hang in their offices or homes, they will be entitled to carry a Sidewalk Superintendent card.

Supplies of the diplomas and cards are being made available by the "Quick-Way" Truck Shovel Co., 4150 Josephine St., Denver 5, Colo., to its distributors and to contractors using its equipment on construction jobs throughout the United States.

Heavy-Duty Crusher

A heavy-duty double-impeller crusher has been announced by the New Holland Mfg. Co., Mountville, Pa. Designed to produce aggregate in two sizes—minus 8 inches and minus 3½ inches—it is said to be capable of taking any stone passing a 50-inch square opening.

There are two impellers, each of which has three pairs of 200-pound bars. Weight of each impeller with bars is 13,400 pounds. These impellers break the stone by striking it in mid-air in the breaking chamber. The impellers are capable of a maximum speed of 785 rpm, with a separate power unit for each which will produce from 100 to 125 hp.

The Model 5050 is 14 feet high, 14 feet long, and 9 feet 4 inches wide. It is mounted on 18-inch I-beam skids, 20 feet long. The total weight of the unit is approximately 93,500 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 91.

Line of Scaffolding

A line of tubular and standard scaffolding in several styles is made by The Patent Scaffolding Co., Inc., 38-21 Twelfth St., Long Island City 1, N. Y. Among the features claimed for this scaffolding are safety, flexibility, and durability. The locking device of the Tubelox members is specially designed to permit joining them in continuous lengths to the size desired. Special couplers are used to join members at right angles or for diagonal connections. Two types of base are standard—caster bases for rolling towers, and standard bases.

This company also manufactures the Gold Medal line of swinging scaffolds for maintenance or repair work on vertical walls. The swing scaffolds are suspended by wire rope, and are operated by light-duty machines equipped with safety locks. Another type of scaffolding made by Patent is the Trouble Saver sectional unit for exterior or interior work.

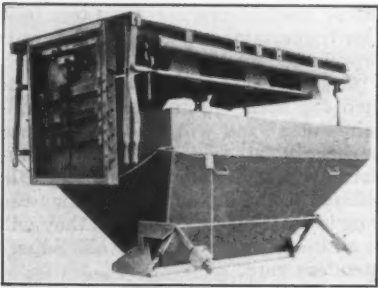
Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 16.

Mechanics' Tools

A complete line of mechanics' tools for all automotive repairs is described in a 108-page catalog made available by the Bonney Forge & Tool Works, Durham and Meadow Sts., Allentown, Pa. Catalog C-1 lists all types of socket and tool sets, socket attachments, open and box-type wrenches, Zenel wrenches, screw drivers, files, chisels, and special-purpose tools.

Each of these tools is illustrated, specifications tell the sizes in which it can be obtained, and special features are described. The catalog also reproduces the Bonney guarantee, and a special insert gives the latest price list.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 46.



Designed for batching all aggregate materials on a single scale, the Johnson Hi-Speed batcher fits the Johnson all-purpose Roadbuilders bin of 2, 3, or 4 compartments.

Aggregates Batched On a Single Scale

Included in the C. S. Johnson Co. display of bins, batchers, chargers, scales, and buckets at the Road Show in Chicago, was the recently developed Hi-Speed batcher. The Johnson Co., a subsidiary of the Koehring Co., is located at Champaign, Ill. Its Hi-Speed batcher is designed for batching all aggregate materials on a single scale. The unit is recommended by the company for use in connection with tandem bins where no central cement compartment is used, or in plants where separate batching is necessary.

The batcher is made to fit the Johnson all-purpose Roadbuilders bin of 2, 3, or 4 compartments. It features a minimum height combined with wide bin openings to accommodate extra-wide fill valves for high-speed operation. The batcher fill gates can be added or removed in the field, and center spacing can be shifted to standard spacings for 2, 3, or 4-materials bins, the manufacturer states.

The scale pivots and shackles are located above and away from any flying materials to eliminate the danger of weight distortion. Scale levers, weigh beams, and indicator are centralized in a one-unit beam box. Other features include weigh beams equipped with moisture-compensating inlays, and reduction of scale-beam oscillation by means of a built-in dampening device on a new type of sensitive indicator. The Hi-Speed batcher has extra-steep slopes in the weigh hopper, and a self-closing counterweighted discharge gate designed for easy tripping.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 115.

Pre-Built Bridges Are Job-Assembled

Prefabricated highway trestle bridges made from pressure-treated timber are available from the Wood Preserving Division of Koppers Co., Inc., Koppers Bldg., Pittsburgh 19, Pa. These bridges are designed to fit individual conditions, and require no special equipment to erect. The entire construction can be done by regular highway crews supplemented with local labor, Koppers states.

Details of design are worked out by the Koppers engineers once they are supplied with information as to length, height, nature of approaches, and other special considerations. All bridge members are then prefabricated, creosote-treated, and shipped to the job site ready for assembly.

Development of this prefabrication service followed a comprehensive study of highway trestle-bridge problems and design. In all such bridges it was found that the width and capacity fell within a few general classifications. The only variables of design were the types of abutment, bent, deck, and railing. From this study, Koppers has set up several standardized types to cover most highway needs. There are 4 types of abutments, 4 types of bents, 2 types of decks, and 6 types of railings.

When long spans are required, rolled I-beams are used for stringers. Where

desired for architectural effect, a composite deck—creosoted timber topped with a tar or concrete traffic surface—may be used with the Koppers trestle bridges. Small metal shear developers and uplift spikes are used to integrate the concrete and wood so that the deck acts as a unit.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 45.

Equipment for Seeding And Roadside Operations

A line of plows and harrows for use in roadside-development programs is described in a catalog put out by the Athens Plow Co., Athens, Tenn. It includes the Series A cutout plowing harrow with 9½-inch spacing, the Series B heavy-duty plowing harrow with 10-inch spacing, the Series C fire-line plow and harrow with 13 or 16-inch spacing, the Series D extra-heavy road and field-plowing harrow, the direct-connected disk plows, tiller-disk plows

with 10-inch spacing and seeder attachments for tiller-disk plows.

The catalog describes each of these models in detail—as to features of operation and construction, complete specifications, width of cut, etc. Several photographs show the equipment while in use.

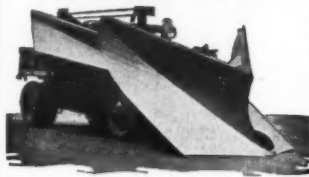
Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 49.

Hewitt-Robins Relocates

Hewitt-Robins, Inc., has moved into its new executive and sales office at 370 Lexington Ave. in New York City. This office will handle eastern sales for the Hewitt Rubber and Restfoam Divisions of Buffalo, N.Y., and the Robins Conveyors and Engineers Divisions which are located at Passaic, N. J., and New York, N. Y.

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CONSTRUCTION MACHINERY DIVISION
Southwest Welding & Manufacturing Company
ALHAMBRA, CALIFORNIA

Tunnel Diverts River In Dam Construction

Flood-Control Project Is Begun as 300-Foot Tunnel With Concrete Lining Is Completed at Tully Dam

▲ A GOOD start was made last year towards construction of Tully Dam on the Tully River in western Massachusetts. As an opening step in the flood-control project, a 300-foot tunnel was bored through rock in the left river bank. Through this the water is diverted, to permit the rolled-fill embankment to be built at the dam site. When completed, the dam will contribute to flood control on the Connecticut River. For this east branch of the Tully empties into Millers River about 4 miles below the project, and the Millers River in turn has a confluence with the Connecticut near Turners Falls, about 20 miles to the west.

The U. S. Corps of Engineers, New England Division, is directing the work. It awarded a contract for the project to the Kelleher Corp. of Turners Falls, Mass., on a low bid of \$762,545. Work got under way in April, 1947, and the job is scheduled for completion this September. The site is located just north of Athol, Mass., and about 10 miles from the New Hampshire border.

For simplification, the project is broken down into five main features: (1) the construction of outlet works including a concrete-lined tunnel and outlet channel, intake structure and intake channels, and superstructure for the intake together with the furnishing and installation of all gates and equipment; (2) diversion and care of the river during construction; (3) construction of a rolled-earth-fill dam with an impervious core, plus random and pervious outer shells, together with dumped-rock fill slopes and an upstream impervious blanket; (4) construction of a concrete spillway weir and training walls, including the excavation of a spillway approach channel and spillway chute; (5) construction of a concrete arch bridge and a section of highway relocation including drainage structures, driveways, etc.

Tunnel Excavation

The most logical way to divert the river from the narrow valley, thus permitting the construction of the dam, was to bore a tunnel through the high left bank of the stream. Favorable topography enabled the engineers to keep the tunnel down to a 300-foot length, by digging open-cut intake and outlet channels, about 500 and 600 feet long respectively, to by-pass the dam site completely. Thus the river now leaves its course about 400 feet above the site, and flows through the tunnel and channels before getting back to its natural bed. Because of a great bend in the river, the water does not get back to its normal channel until about 1,200 feet downstream from the site.

Plans and specifications called for a 6-foot-inside-diameter tunnel, lined with plain concrete at least 8 inches thick, but with a pay-line thickness of 14 inches. Only the transition sections at the ends carry reinforcing steel. Both the boring of the tunnel and the concrete lining work were sublet to the Curley Construction Co. of Teaneck, N. J. Tunnel excavation totaling 600 cubic yards started June 20, 1947, and was finished by the middle of August.

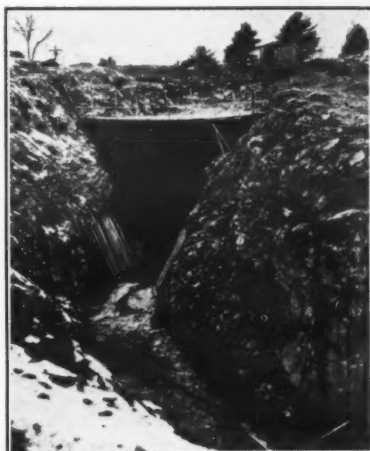
After trimming the interior and getting the forms in shape, the subcontractor made the first tunnel lining pour on October 15, and completed the "barrel" concrete on November 21, 1947.

In the limited area of the tunnel face, only one water-line drifter was employed at a time in drilling blast holes. The drill, either an Ingersoll-Rand or a Worthington, was mounted on a 3-inch-diameter pipe cross pedestal. With this type of mounting the single drifter reached any desired point on the tunnel face. Drill-steel lengths started with 30 inches, increasing to 60, 90, and a 120-inch maximum. The usual pro-

cedure was to drill horizontal holes 9 feet deep in order to get 8 feet of excavation at a single blast.

Around the perimeter of the face, ten line holes were drilled for No. 3, No. 4, and No. 5 delay shots. At the bottom of the ring there were generally three No. 5's, with another No. 5 at the top. On each side were one No. 3 and two No. 4's. Five holes were drilled on the tunnel center line and instantaneous charges were placed in the second and fourth holes, while the first, third, and fifth were uncharged. Drill holes on each side of the center hole contained No. 1 delay charges. The rest of the charge consisted of about four more holes spotted between the center of the face and the perimeter, and charged with No. 2 delays.

A 300-gallon water tank on the hill above the tunnel supplied water by (Continued on next page)



C. & E. M. Photo
This was taken outside the upstream or inlet end of the river-diversion tunnel recently completed at Tully Dam.

● Pioneer Contracting Co., Inc. of Dyersburg, Tennessee has been a steady user of Euclid Equipment since it first purchased Bottom-Dump Euclids in 1935 for levee work. One of the leading dam and levee contractors, this company has constantly added to its fleet because it has found that Euclids consistently move dirt at lowest cost per yard on the toughest jobs.

"We have used 'Eucls' continually", reports Guy Hall, "because we know we can always depend on their performance. They are easy to handle, deliver big yardages day after day, and save us time and money."

Ability to haul large pay loads over soft fills and to dump loads clean and fast are two reasons why Bottom-Dump Euclids are so widely used on construction jobs. Your Euclid distributor or representative will be glad to discuss your requirements and supply helpful information.



The EUCLID ROAD MACHINERY Co., Cleveland 17, Ohio

The AMERICAN RED CROSS
Carries on!
GIVE!





C. & E. M. Photo

Kelleher Corp. winterized its Blaw-Knox aggregate bin by spreading tarpaulins on top and in front, protecting its sides with lumber and tar paper and placing coke-burning salamanders underneath to keep the aggregate warm.

Tunnel Diverts River In Dam Construction

(Continued from preceding page)

gravity flow to the drifter drill, which was hooked up to two air compressors—a 315-cfm and a 105-cfm. The holes were charged with Atlas 40 per cent dynamite, and the average blast required from 95 to 100 pounds. Drilling and blasting were done by the night shift working from 4 p. m. until midnight. The three-man night crew consisted of driller, helper, and compressor operator. Then, when the five-man mucking crew came on the job the next morning at 7 a. m., the dynamite fumes had cleared away without the use of ventilating fans.

Mucking was done by a Sullivan slusher which piled the rock at the tunnel portal where it was removed by tractor and scraper. The slusher also operated on compressed air. With the two shifts, the tunnel excavation proceeded at the average rate of 8 linear feet per day.

Concrete Lining

A Ransome horizontal concrete placer, located at the tunnel outlet, was used to line the tunnel. Lining was commenced at the upstream end and proceeded on a 0.0185 grade to the outlet. The placer was powered by a battery of four air compressors—three of 315-cfm capacity and one of 105-cfm. These pumped air into a steel tank receiver, thereby supplying compressed air to the placer at the required rate of 1,000 cfm with a pressure of 100 pounds per square inch.

The invert was poured first. Wooden forms were used to bring the concrete 6 inches above the invert on each side of the flow line, forming a construction joint at curb level with the rest of the tunnel.

Then the forms for the barrel were erected, consisting of three 10-foot sections permanently bolted together so that 30-foot sections were poured at a time. The wooden barrel forms were made of 2 x 6 lagging, beveled to fit the circular bore, and braced every 3 feet 4 inches with 2-inch channels and angle irons. They were hinged at the top for facile erection and removal. At the spring line inside the forms, double 2 x 6 wales ran the length of the section with Richmond Tyscrus at 4-foot intervals. These ties were anchored into the rock along with two other ties at the bottom of the form to hold it in position. Adjustments were made with turnbuckles crossing at the base of the forms. To remove the forms, the turnbuckles were loosened and the bracing removed; the forms could then be folded at the hinges. A cable was attached to the form and it was skidded by a tractor along the completed invert to its new position.

The concrete was pumped through a 6-inch pipe with a maximum length of

300 feet, made up of lengths varying from 6 to 20 feet. Each section was equipped with flanged joints. The pipe ran along the center of the tunnel on wooden supports until the form was reached. Then it made a 45-degree bend to the top of the tunnel where it turned again on a 45-degree bend to enter the form. As each 30-foot pour progressed towards the tunnel outlet, sections of pipe were removed from the line. The forms were kept on for 24 hours. The 30-foot sectional pours averaged slightly less than 30 yards of concrete.

Later, to make certain that all cracks and crevices in the rock surrounding the tunnel were filled, grout was pumped through holes drilled in the tunnel arch. The holes were at 10-foot intervals, in groups of three, spaced at one-eighth of the circumference.

Batch Plant

The Kelleher Corp. set up a Blaw-Knox 103-ton 3-compartment aggregate bin on the side of a hill. This arrange-



C. & E. M. Photo

Blast holes are drilled into rock for Tully Dam spillway excavation. In the foreground are two Ingersoll-Rand wagon drills; in the rear is a Worthington.

ment permitted the sand and gravel to be dumped directly into the bin without

the need of a crane and clamshell bucket for loading. The aggregate was supplied by the Northfield Sand & Gravel Co. of Northfield, Mass., which delivered the material in trucks after a 26-mile haul.

For protection during the cold weather, when concrete was still being poured, tarpaulins were stretched over the top of the bin to cover the aggregate. Other tarpaulins hung down in front and were pulled back to one side when a truck-mixer backed in for a load. Lumber and tar-paper walls were erected at the sides to give complete enclosure. The bins were heated from beneath by coke-burning salamanders during mild weather, and a steam boiler during severe weather.

Ironclad cement, purchased from the Glens Falls Cement Co. at Glens Falls, N. Y., was shipped in bags by rail to the Boston & Maine Railroad siding at Athol, Mass., and trucked 5 miles to the batch plant. There the cement was added by hand to the two 3-yard truck-

(Continued on next page)

air packs a more powerful punch



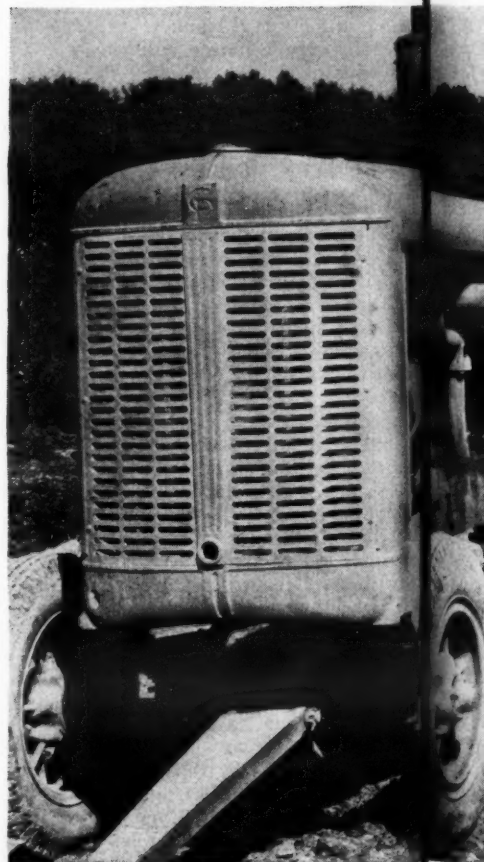
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mixers of R. T. Curtis Co. of Barre, Mass., who had a subcontract for mixing the concrete and delivering it to the job pour. In the tunnel work the truck-mixers discharged the concrete directly into the hopper of the Ransome placer.

Water for the mix was also added at the plant. It was pumped from the river 200 feet away through a pipe line by means of a 2-inch pump. Darex AEA air-entraining agent was added to each batch at an average rate of 14 cc per bag of cement. But this figure was subject to considerable variation as the engineers strove to maintain a uniform air content of around 4 per cent. Batches were mixed from 5 to 7 minutes in the truck-mixers. The concrete had a cement factor averaging 5½ bags to the yard, with a slump around 3 inches.

In the tunnel work the aggregate in the concrete was ¾-inch maximum, while both ¾ and 1½-inch sizes were used in the other pours such as transition sections, intake structure, etc. Weights of typical 8-bag batches of the two types of concrete utilized to date

are as follows:

	Transition-Intake Concrete	Tunnel Concrete
Cement	752 lbs.	752 lbs.
Sand	1,794 lbs.	1,875 lbs.
Gravel, ¾-inch	1,521 lbs.	2,686 lbs.
Gravel, 1½-inch	1,521 lbs.	366 lbs.
Water	366 lbs.	366 lbs.

The aggregate used in the concrete conformed to the following gradation:

Sieve Size	Per Cent Passing		
	1½-Inch Gravel	¾-Inch Gravel	Sand
1½-inch	90-100	....	....
1-inch	20-45	....	....
¾-inch	0-10	90-100	....
¾-inch	0-5	30-55	....
No. 4	....	0-5	95-100
No. 8	....	....	80-90
No. 16	....	....	55-75
No. 30	....	....	30-60
No. 50	....	....	12-30
No. 100	....	....	3.5-10

Earth and Rock Excavation

Last year while the subcontractor was constructing the tunnel to take the normal flow of the river this year, the Kelleher Corp. was busy on other phases of the project. The site was cleared and stripped, and a road was built which eventually will cross the



C. & E. M. Photo

A Lorain 77 1½-yard shovel loads rock blasted from the Tully Dam spillway cut into a Sterling 6-yard truck.

dam. A permanent utility field office for the project and dam was constructed on this road between the dam and the

spillway chute. The new highway bridge will span this spillway channel. The outlet channel for the tunnel was excavated to a bottom width of 30 feet and the intake channel to 22 feet, both with 2 to 1 side slopes. Excavation for the spillway was started. After the dam site was stripped, a core trench was dug except in the riverbed. The riverbed was sound enough to permit stripping operations to be completed during low water.

Considerable hard ledge rock, running mostly to granite, was encountered in these open cuts, and in the spillway excavation it was taken out in three 12-foot lifts. Holes were drilled with four wagon drills—three Ingersoll-Rands and one Worthington. And there were five compressors on the job—three Ingersoll-Rands of 315-cfm capacity, one I-R of 105-cfm, and one 315-cfm Worthington.

Drill steel 1¼ inches in diameter was used in lengths of 6, 8, 12 and 16 feet, with bits going from 2½-inch down to 1¼-inch sizes. In some of this hard rock four or five bits were required to drill as little as 2 feet. Holes were usually spaced on 5 to 6-foot centers both ways, and charged with 40 per cent dynamite produced by either Atlas, Hercules, or du Pont. The deep holes took from 12 to 15 sticks, 1¼ x 8-inch, and from 35 to 40 holes were blasted at a time.

Mucking was done by two Lorain 77 1½-yard shovels, loading into a fleet of five or six Sterling 6-yard trucks which were hired by the hour. Some of the material was stockpiled, while other rock was placed on the downstream side of the dam outside the riverbed limits. A work bridge was built across the river upstream of the dam site, since the wooden bridge on the existing macadam road at that point was incapable of carrying heavy loads.

Some impervious material was removed in the general excavation and placed as the core of the earth dam. Part of this was hauled by the trucks, but on the shorter hauls two Le-Tourneau LP 12 to 15-yard Carryalls pulled by Caterpillar D8 tractors were used. One D6 and two D7 dozers were available for push-loading. They also spread the material in 6-inch lifts which were compacted with six passes of a sheepsfoot roller. To get the optimum moisture, a 500-gallon tank truck was on the job, but the material was usually wet enough so that the tank did not have to be used. On both the impervious and random fills the compaction was achieved by a Grace sheepsfoot roller pulled by a D8. This exerted a pressure of 250 pounds to the square inch when empty, or 450 pounds when ballasted with water. A Caterpillar No. 11 motor grader shaped the fill.

Dam and Spillway

This year the remainder of the rolled-fill earth dam is being constructed. (Concluded on next page)

To keep air compressors delivering full volume and pressure, keep valves clean, rings free, ports open and air lines clear by using *Texaco Cetus, Alcaid or Algol Oils*. All have been specially processed to remove impurities that form hard carbon and gummy deposits. Thus, compressors stay clean and efficient . . . require less servicing . . . cost less for maintenance.

To handle *wet air*, use *Texaco Regal Oils (R & O)*. They give the same fine lubrication *plus* full protection against rust formation . . . even during idle periods and in intermittent operation.

For longer drill life . . . greater protection against rust and wear . . . operators everywhere prefer *Texaco Rock Drill Lubricants EP*.

A Texaco Lubrication Engineer will gladly show you how the Texaco Simplified Lubrication Plan assures better performance and lower maintenance costs with *all* construction equipment. Just call the nearest of the more than 2500 Texaco Wholesale Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.



Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

Tunnel Diverts River In Dam Construction

(Continued from preceding page)

Pervious material is taken from a gravel pit about a mile from the site, where it is excavated by a Northwest $\frac{3}{4}$ -yard dragline and hauled in trucks. The dam will be about 1,200 feet long with a maximum height of about 65 feet. The greater portion of the embankment extending from the right abutment to high ground will be only from 10 to 15 feet high however. The top of dam is at elevation 684 and has a 30-foot crown. The greatest width through the base is about 450 feet. Downstream slope is $2\frac{1}{2}$ to 1, with a rock toe sloping down on an 8 to 1 from elevation 640.0. The upstream face will be on a 3 to 1 slope with a protective covering of 3 feet of dumped rock.

The concrete spillway weir will be 255 feet long with an average height of 18 feet, and will be completed this year. The crest will be at elevation 668.0. The reservoir behind the dam will be from 3 to 4 miles long but with little width because of the narrow river valley enclosed by hills.

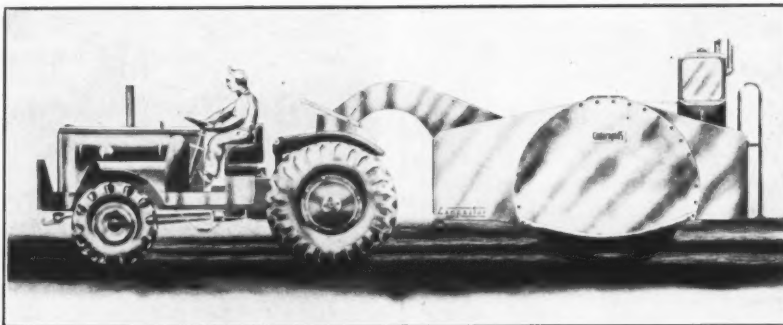
Soil-Compacting Unit Has Vibratory Action

A rubber-tire soil compactor featuring vibratory action was announced at the ARBA Road Show by the Iowa Mfg. Co., 916 N. 16th St., Cedar Rapids, Iowa. According to the manufacturer, the Cedarapids Compactor will produce noticeable increases in the density of soils at depths of 3 feet and more. As a result, it is possible, the company explains, to spread lifts of greater depth and to compact them to the required density.

The Compactor works on the principle of flotation of heavy loads without lateral soil displacement, aided by a vibratory action. This is designed to produce a directional depth penetration of pressure, maximum compaction, and density satisfactory for construction specifications without affecting the top surface.

Adjustment to different soil conditions is obtained by changing tire pressures or the weight of the unit. For deep penetrations, maximum weight and tire pressure are required. On surface compaction such as 6 to 18-inch depths, the tire pressures and weights are reduced to a point where lateral displacement is the least.

The vibratory action which produces a compacting action through the tires is created by a vibrator unit mounted on the axle and held down by superimposed springs. Power for operating



The new Cedarapids rubber-tire Compactor features a vibrator unit which produces a tamping action through the tires. It increases the density of soils at depths of 3 feet and more, Iowa Mfg. Co. points out.

the vibrator is supplied by a gasoline engine. Vibrations can be controlled through a range of from 700 to 1,400 cycles per minute, depending on soil requirements. The Compactor can also be used as a rubber-tire roller without the vibrator running. But, the manufacturer points out, an additional 3 to 10 per cent compaction is obtained with the vibratory action.

The Compactor may be towed by either rubber-tired or track-type tractors at speeds of from 1 to $2\frac{1}{2}$ mph. It is made in two sizes—one weighing 60,000 pounds and the other 25,000 pounds when fully loaded. The No. 60 is 19 feet 7 inches long, 9 feet 2 inches wide, 9 feet $1\frac{1}{2}$ inches high, and it has two 24:00 x 32 smooth-tread 36-ply tires. The No. 25 is 15 feet long, 9 feet

2 inches wide, 7 feet 6 inches high, and has four 10:00 x 20 tires.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 1.

Canvas Curtains, Covers

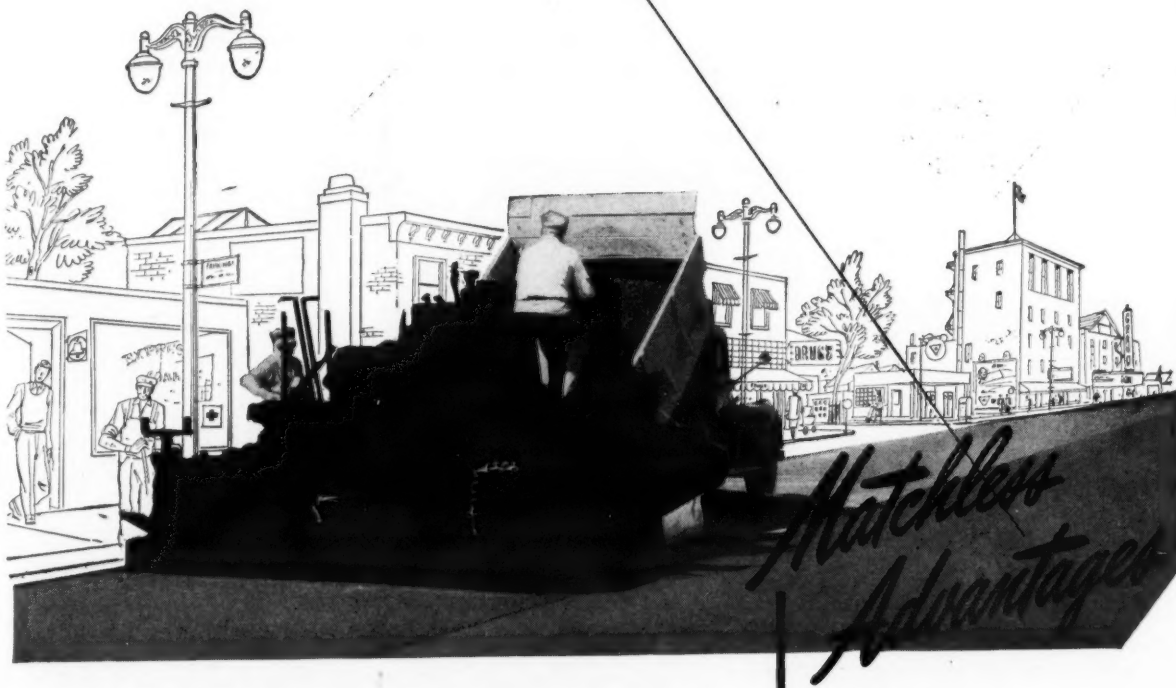
An informative folder about its line of flameproof canvas welding curtains can be secured from the Industrial Products Co., 2914 N. 4th St., Philadelphia 33, Pa. It describes the features of this curtain, tells how it is constructed and reinforced, and explains its fireproofing and waterproofing characteristics.

The catalog also describes the Ipeco line of tarpaulin salvage covers, and the Ipeco asbestos fire blankets. It points out the features and uses of both these items, and also lists prices and other details. A sample of the welding curtain is contained in the folder.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 60.

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Built into the B-G Tamping-Leveling Finisher are advantages that combine to assure superior performance on the widest variety of bituminous paving jobs. For instance . . .

The B-G Finisher tamps, levels and "strikes off" simultaneously—automatically measures the correct amount of compacted material for the depressions—leaves a level surface that is maintained under rolling and traffic. The B-G Finisher automatically adjusts to differences in the sub-grade and lays to the established grade.

There are other important advantages. For the whole story of B-G Finisher performance, see your Barber-Greene distributor.

Positive Traction

Crawlers have the traction to push loaded trucks up grades while unloading . . . plus adequate control of steering necessary on any job.

Large Hopper

Five-ton hopper saves delays, allows Finisher to operate between truck loads.

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The B-G Finisher may be operated from either side—for easier control while matching previous mat.

Wide-Range Utility

For all bituminous jobs—from sheet asphalt to stabilized mixes—the B-G Finisher is economical, efficient and adds to the quality of the road.

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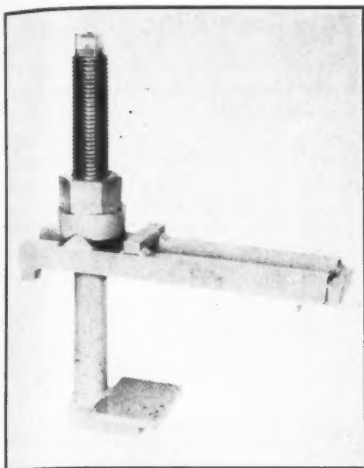
LOS ANGELES - - - CALIFORNIA



BARBER • GREENE COMPANY AURORA, ILLINOIS

Constant flow Equipment





This is the new concrete-slab-leveling jack made by Templeton, Kenly & Co., and demonstrated at the Road Show.

Slab-Leveling Jack Viewed at Road Show

Correcting slab deflection at joints and along cracks in concrete roads is a problem which constantly confronts highway engineers. One method of handling it was demonstrated by Templeton, Kenly & Co., 1006 S. Central Ave., Chicago 44, Ill., at its booth at the 1948 Road Show. The method makes use of the company's new Simplex concrete-slab leveling jacks.

Holes are drilled along the crack, spaced on 2-foot centers. Several of these jacks are inserted in the holes to the bottom of the slab. The drawbar pull used to level a lowered slab works on the top surface of the high side, and the lower surface of the depressed slab. The pull is taken by degrees, progressively on each jack, until the slab is gradually restored to position. Jacks of another type are used on the shoulder edge and are likewise moved upward by degrees. Alternate jacks in the transverse opening are then removed and the subgrade under the lifted slab is hosed.

A Mud-Jack with an aggregate-nozzle attachment is used to pump aggregate under the slab to fill the cavity completely. The Mud-Jacked aggregate, not having to lift the slab, finds no resistance to its penetration to the farthest points under the slab, the jack manufacturer points out. By this means, a permanent repair is accomplished. The remaining jacks are removed after the concrete under the slab has partly set. The holes are then filled with the same aggregate to their top level.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 116.

Data on Air Compressors, Diagonal-Screed Finisher

Three new catalogs have been released by The Jaeger Machine Co., 701 Dublin Ave., Columbus 16, Ohio. Bulletin C-160-8 is on the Model No. 160 Air-Plus compressor; Bulletin No. 6JC-7 is on the 500 and 600-cfm-capacity Air-Plus compressors; and the third bulletin is on the Jaeger Type X diagonal-screed finisher.

The compressor catalogs contain large photographs of the models described and list their principal features and specifications. They point out the type of equipment with which each model can be used, and include other operational data. The power units and individual parts of the compressors are also covered in detail.

The 16-page catalog on the new Jaeger finisher features several photographs of the equipment in use, and several demonstrating its construction. Sectional drawings and superimposed sketches are also used to illustrate the way the diagonal screed functions. The bulletin points out the service for which the unit is recommended, its capacities,

and its complete specifications.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. For the compressor catalogs, circle No. 119; for the diagonal-screed finisher, No. 120.

Powered Wheelbarrow

A powered wheelbarrow was introduced at the July Road Show by the Kwik-Mix Co. of Port Washington, Wis., a subsidiary of the Koehring Co. The Moto-Bug is powered by a 3.9-hp gasoline engine, and has a rated capacity of 10 cubic feet or approximately 1,000 pounds. It is driven through a V-belt drive and fully enclosed gears. And it is equipped with finger-tip control of speeds, which vary from 2 to 4 mph



A 3.9-hp gasoline engine drives the Moto-Bug wheelbarrow, which has a rated capacity of 10 cubic feet or approximately 1,000 pounds.

both forward and reverse.

Features claimed for the unit include an instantaneous gravity-dump body with chain stop; a steering device which

is simple and easy to handle and which turns the machine in its own length; a maximum width of 33 inches; and a differential on the front axle. It is mounted on two rubber-tired wheels with a single rubber-tired steering wheel.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 114.

Link-Belt Opens in Albany

Link-Belt Co. has opened a district sales office in Albany, N. Y., at 309-310 First Trust Co. Bldg., 444 Broadway. J. Charles Bullock has been appointed District Sales Manager. He formerly held the same position at Link-Belt's Schenectady office, which has been discontinued.

Curved offset edge for better penetration — better boiling action — better balanced loads.

Four speeds forward — up to 18 m.p.h. — more trips per hour — more profit per job.

Positive, complete ejection of any kind of material — saves seconds and minutes each trip.

LaPLANT-CHOATE MOTOR SCRAPERS

... produce more yards at lower cost

because **THEY CONSISTENTLY GIVE YOU MORE HOURS OF TROUBLE-FREE PERFORMANCE!**

With an absolute minimum of working parts, easy, trouble-free operation and maintenance assures a unit that will work hour after hour without costly down-time.

Simplicity of controls means easy operation. Double-acting hydraulic steering assures safe, positive steering with 60° turns each way without danger of jackknifing.

Improved, air-actuated LPC power control unit operates scraper with peak efficiency. Sixteen horsepower per struck yard of capac-

ity for "plenty of power," up and down grade, in any material.

The scraper units are modern LPC scrapers which have been proved, by competitive test, to be the easiest loading, fastest spreading scrapers on the market!

See your nearest LPC distributor for complete details and operating data. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; 1022 77th Avenue, Oakland, California.

LaPLANT CHOATE

HIGH SPEED EARTHMOVING EQUIPMENT

FOR LOWEST POSSIBLE COST
PER YARD...PER JOB...PER YEAR

On-the-Job Safety Stressed by Builder

Safety is the keynote on a bridge-building project now under way by The Contracting Division of the Dravo Corp., Pittsburgh, Pa. This company is building the substructure for a 1,931-foot-long bridge across the Monongahela River, near Pittsburgh. The substructure is comprised of twelve 90-foot concrete piers and two abutments. Ten of the piers are on land, and two are in the river.

Scaffolding is built integrally with the wood concrete forms in order to provide maximum protection for the workers. The handrail posts are installed at a 135-degree angle to the scaffolding so that the top rails are 2 feet further out than the scaffold plank. The area between the top rail and the scaffold is covered by a 1-inch wire-mesh screen.

The purpose of this arrangement, it is explained, is that the workmen at lower levels are protected against falling objects, and topmost workmen have additional chances to save themselves if they should fall. The forms were placed in position by whirler cranes with 130-foot booms.

Access to the scaffolding is by tower stairways equipped with handrails. These were adopted in preference to ladders, because it is felt by the company that they provide an added measure of safety. Also, tools and small loads can be carried safely on the stairways.

In addition to "built-in" job safety, Dravo has undertaken a program of complete safety education. Workmen are provided with personal protective equipment, as required, including goggles, welding hoods, safety belts, kapok-filled life jackets, and hard hats. Employees are required to take medical examinations when hired. Each is given a copy of "Dravo Field Safety Orders", for which he signs a receipt. Regular safety meetings of supervisory personnel are held every three weeks to discuss current problems.

Fire extinguishers are installed at strategic locations throughout the construction area, and a 2-inch water line has been run into the job site with hydrants and hose placed near major buildings. During early stages of the work, a traffic study of the project area was made by Dravo's safety department in collaboration with the Allegheny County Traffic Engineer. Warning signs are placed at appropriate locations to inform motorists about the job, and flagmen are assigned as needed.

Nordberg Promotes Schultz

R. R. Schultz is the new Sales Manager of the Crusher and Process Machinery Divisions of the Nordberg Mfg. Co. of Milwaukee. Mr. Schultz joined Nordberg in 1938 as a Sales Engineer; before that, he was associated with the Traylor Engineering & Mfg. Co. of Allentown, Pa.

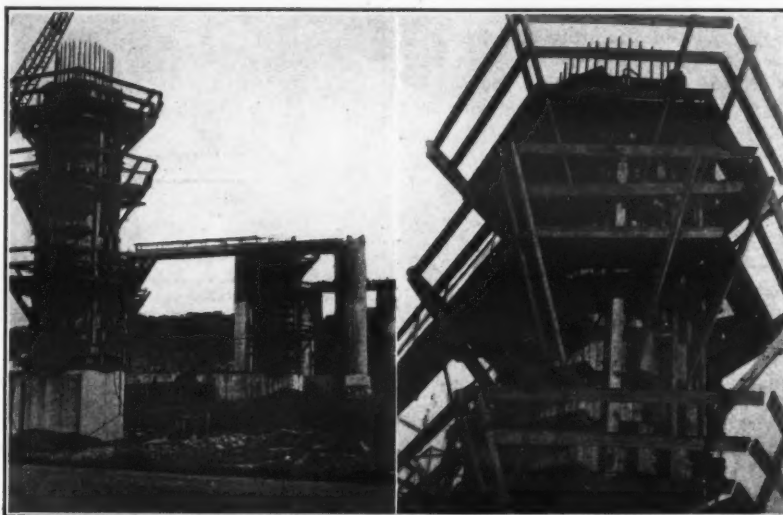
A. C. CURRENT ANYWHERE

with Katolight Generators

Sizes from 350 watts to 175 KW. Also manufacturers of complete lighting plants and rotary converters. Three phase totally enclosed motors and single phase A. C. motors in 1½, 2 and 3 horsepower. Katolight engineers have been building A. C. Generators for nearly 20 years.



See your auto parts jobber or equipment dealer
KATO
ENGINEERING
COMPANY
118 Maxfield
Mankato, Minn.,
U.S.A.



Scaffolding with wide-angle railings and well built wooden stair towers is an integral part of the forms for bridge piers. The structure is being built across the Monongahela River near Pittsburgh, Pa., by The Contracting Division of Dravo Corp. Photo at right is a close-up of the scaffolding, showing the unusually wide angle at which the railing extends from the platform. The space between the railing is covered with wire mesh to protect workmen from falling objects.

BE-GE

Hydraulically Operated

SPEEDHAULS

for fast earth moving at low cost!



SS Models for use with Industrial type rubber tired tractors.



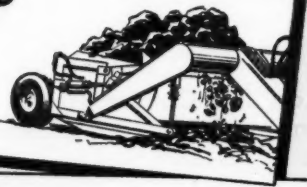
ST Models for use with track-type tractors.

Fully hydraulic Be-Ge Speedhauls are designed to achieve maximum earth moving efficiency and constructed to give years of trouble free service. By moving more yardage per trip and making more trips per hour, Be-Ge Speedhauls show you a profit on every earth moving job.

Finger-tip hydraulic controls instantly regulate the CUT, LIFT, DUMP, and SPREAD operations. Operator with a clear view of the blade at all times can adjust cutting and spreading depth hydraulically. Forced "roll out" ejection empties the bowl quickly and cleans it. Positive down pressure on the blade maintains a uniform depth of cut in all materials.

Heaped capacities of the three SS and ST Model Speedhauls now in production are: 530, 3 cu. yds.; 645, 4.5 cu. yds.; 760, 6 cu. yds.

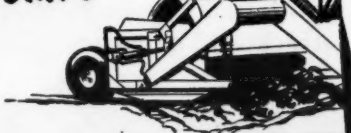
DIGS



CARRIES



DUMPS



SPREADS



See your Be-Ge dealer or write factory direct for specifications and prices.

BE-GE MANUFACTURING CO.
GILROY, CALIFORNIA

Wire-Rope-Sling Catalog

Literature on a complete line of wire-rope slings and related equipment can be secured from American Chain & Cable Co., Inc., Wire Rope Sling Dept., Wilkes-Barre, Pa. The Acco line consists of basket, bridle, and choker slings in strand-laid, cable-laid, and 6 and 8-part braided styles. These are made in a wide range of diameters, and with several types of accessories to meet all sling requirements. The catalog illustrates each of these units equipped with thimbles, choker hooks, armored loops, and other types of hooks. A feature of the catalog is a description of the Acco-Loc improved splice.

The catalog contains several photographs of wire-rope slings being used on a variety of jobs. Accompanying them are drawings showing the features of each style, and data on the standard sizes in which they are provided.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 59.



This is the Nelson P-10 heavy-duty wheel-mounted bucket loader, one of two new models recently announced. They both feature renewable toothed feeders that "pick before they shovel".

New Bucket Loader Has 3-Yard Elevator

Heavy-duty bucket loaders in two models are announced by N. P. Nelson Iron Works, Inc., Dept. 7-B, Clifton, N. J. They have 3-yard elevators and hydraulic boom hoists, and feature a 16 to 1 ratio between high and low working speeds. The Model P-10 is wheel-mounted; the Model Q-10 is crawler-mounted.

The steel-toothed feeder spirals are designed to pick at the material and loosen it before it's shoveled. This feature is said to prevent extreme shocks to the loading system, and to aid in heap-loading the material into the buckets. The toothed feeder strips are renewable. Power is supplied by a 40-hp Le Roi gasoline engine. The unit is equipped with Timken bearings, Twin Disc clutches, and an automatic relief clutch on the elevator drive. A self-releasing friction clutch protects the engine from damage by overloads.

Standard digging speed of the P-10 is listed at 27 cubic feet of material per minute; travel speed is set at 5 mph. Standard digging speed of the Q-10 is 18 cubic feet per minute, and travel speed, about 3½ mph. Nelson loaders can be used with sand, broken stone, and other loose or screened materials up to about 3-inch cube. With the addition of a Nelson rotary screening unit, the manufacturer states, the Q-10 can be made into a portable sand and gravel plant. Weight of the P-10 is approximately 12,500 pounds; of the Q-10, approximately 14,500 pounds. With the boom lowered, both units can pass under a 10-foot clearance.

Further information may be secured from the company, or by using the enclosed Request Card, Circle No. 42.

Diesel-Engine Features Explained in New Catalog

A booklet of general information on the construction and operation of diesel engines has been made available by the Hercules Motors Corp. of Canton, Ohio. It explains the basic characteristics and functions of this type of engine, and answers many questions.

The booklet begins by discussing the advantages of the diesel. It covers the function and construction of the component parts of the engine, with special attention to those parts which are peculiar to diesels. It discusses the fuel-injection system, the Hercules combustion chamber, etc. It describes the operation of the 4-cycle, 4-stroke engine, and illustrates by means of text and sectional drawings the action that takes place during each stroke. Two pages compare the operation of the 2-cycle engine with that of the 4-cycle.

The starting of diesel engines is treated, and the merits of the various types of starting equipment are analyzed—gasoline, electric, or compressed-air starters. A list of diesel fuel-oil specifications, and a discussion of lubricating oils, acceleration, and

cylinder pressures completes the general diesel information presented in this bulletin.

The catalog also lists several heavy-duty Hercules diesel engines in 2, 4, 6 and 8-cylinder models ranging from 12 to 400 hp. Technical data presented on these units include maximum horsepower, maximum torque, compression ratio, injection system, weight, bore and stroke, and piston displacement.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card, Circle No. 43.

Crack-Sealing Paste

A product said to seal cracks and joints in dry-wall installations in one operation is announced by Lowebo, Inc., 1525 E. 53rd St., Chicago 15, Ill. Known as Plastape, it is applied in paste form with a putty knife. According to the manufacturer, it dries quickly and leaves no bumps or irregularities on the wall surface. Furthermore, it is said to have enough elasticity to allow for

necessary expansion and contraction. It is especially recommended by Lowebo for new-building construction and in the repair and refinishing of old

plaster walls.

Further information may be secured from the company, or by using the enclosed Request Card, Circle No. 57.

MARK FOR SAFETY

... SAVE WITH THE NEW WAY LINE MARKER

Keep your town safe . . . keep all crossings, safety islands, parking spaces clearly defined with the "New Way" Line Marker. No more brushing, spraying or pouring . . . R-o-l-l paint on the "New Way" to eliminate waste, cut job time from days to hours, reel off thousands of extra cost-saving yards daily. Gives sharp 4" line; tank holds 4 to 5 gallons; permits quick color change. No nozzles, pumps or hose to clog . . . simple, foolproof, trouble-free. Send for Bulletin 203.

NEWAYGO ENGINEERING CO.
NEWAYGO, MICHIGAN
OFFICES IN PRINCIPAL CITIES

THE New Way LINE
Complete both material
recoiling system, plus
handles, handles.



CUT THE DOWNTIME! . . . SPEED UP THE JOB!
INCREASE THE PROFIT! WITH . . .

Firestone TIRES



EARTH MOVER

ROCK GRIP

ALL-TRACTION

**LESS DOWNTIME . . . MORE SPEED . . . MORE DIRT
MOVED . . . THESE ARE THE KEYS TO PROFIT ON ANY JOB**

Firestone pioneered in building big tires for earth-moving and other off-the-highway equipment, and through the years, Firestone has licked all the problems of off-the-highway operation.

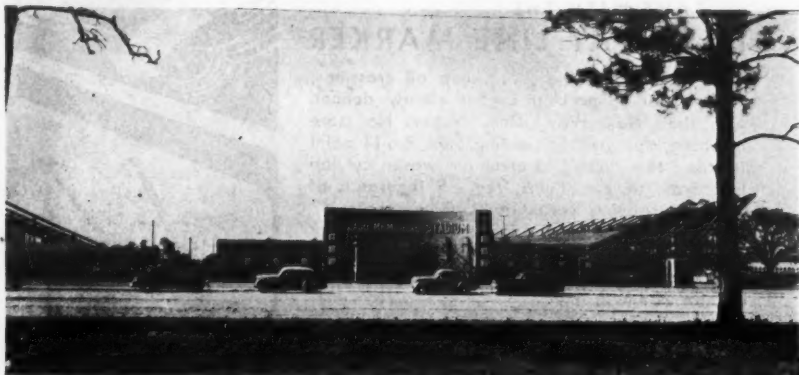
Backed by this experience, Firestone knows how to build tires that take the gaff day in and day out . . . tires that cut costly downtime . . . tires that speed up the job and help you make a profit.

Give Firestone tires a trial. Let them prove themselves on your equipment on the toughest job you have. They will save you money.

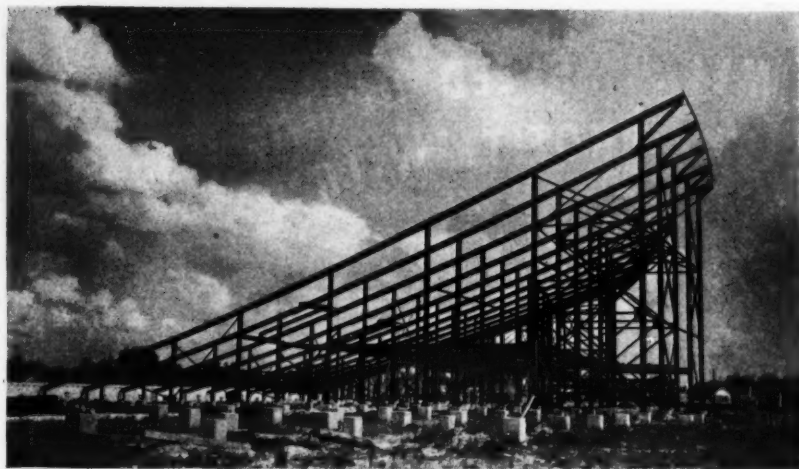
Copyright, 1948, The Firestone Tire & Rubber Co.

Firestone OFF-THE-HIGHWAY TIRES

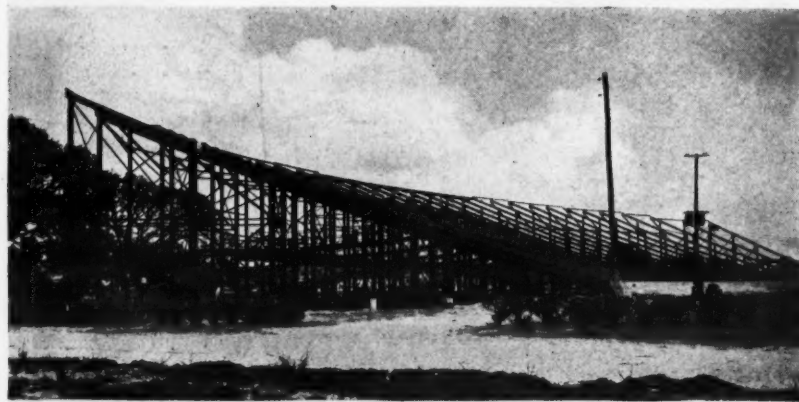
Football Stadium Is Of Steel Construction



The University of Alabama and Vanderbilt University will play their classic football game this October at the new \$1,000,000 Ladd Memorial Stadium in Mobile, Ala. General contractor J. P. Ewin, Inc., will have it finished by September 1.



Concrete pedestals, rising from concrete footings, support the steel framework for the two stands on the east and west of the 160 x 300-foot playing field. This is the east stand pictured here, and the camera is pointing north.



This is the west stand, again looking north. It is like the east stand except that it will contain a press box and broadcasting booth at the top and center. End-stands may be built later if they are needed.



(C. & E. M. Photos)

Here a couple of bolt-and-nut gangs work on structural-steel framework rafters which connect the tops of the columns on the radial lines. They remove the temporary erection bolts and drive permanent bolts through holes already punched in the steel. The bolts are equivalent to 3/4-inch rivets and are a trifle oversize with respect to the punched holes so that they cut the metal slightly as they are driven. They are then drawn up tightly with nuts. Each two-man crew has a Chicago Pneumatic hammer and an impact wrench driven by a Jaeger 105-cfm air compressor. The crews work from plywood floats suspended from the rafters by ropes.

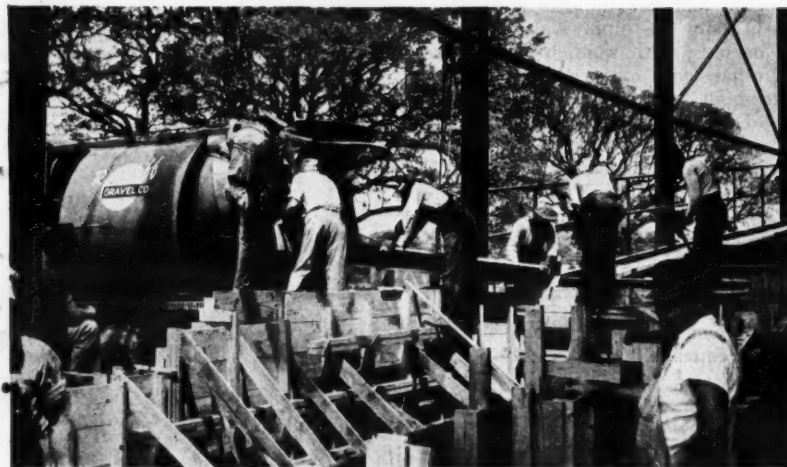
Personnel on the job includes (left to right) Engineer J. E. Thrasher, Jr., for the Ewin company; Superintendent "Slim" Hall for Bender Welding & Machine Co., steel-erection subcontractor; and Assistant Superintendent H. R. Blackerby for J. P. Ewin, Inc.



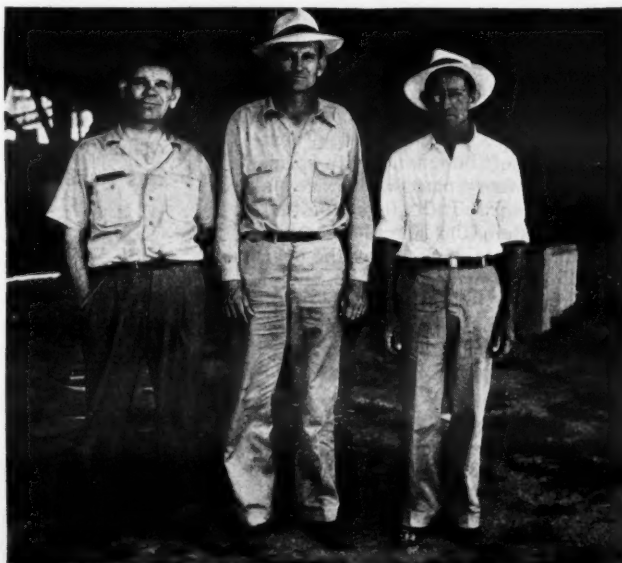
The L-shaped step plates, which will seat 30,000, are pulled up into position on the framework by means of a "Joe Magee" consisting of cable, sheave blocks, and a Jeep. The plates, as shown here, ride up the framework on runners.



As one man uses a hooked bar to pull and lock the seat plates together, the other tack welds them at horizontal and vertical seams. Later they will be finally welded—not to strengthen but to waterproof the deck.



The stadium is not entirely steel construction; the footings, pedestals, walks, ramps, and concourses are concrete. Here a Rex 6-yard Moto-Mixer on an Autocar chutes concrete into wall forms for the approach ramps.



Football Stadium Is Of Steel Construction

(Continued from page 1)

distance at the curving center is only 60 feet.

Room for Additions

The central portion of each stand is laid out on a radius of 460 feet, with the curve compounding at each end of the stand to a radius of 155 feet. This compound curve may be continued to close in the now open end zones if it is desired to enlarge the stadium at any future time. If this were done, the structure would then be a complete bowl. Along the chords of the arcs in the layout of the stands, the spacing of the footings varies from 12 feet 8 9/16 inches to 15 feet 8 7/16 inches. On the radial lines the spacing is from 15 feet 2 inches to 19 feet 6 inches.

Early spring delivery of steel enabled the contractor to start erection on March 1. The 1,300 tons of structural steel required was fabricated by the Virginia Bridge Co. and shipped from its Birmingham, Ala., plant to a conveniently located siding of the Gulf, Mobile & Ohio Railroad at the southwest corner of the site. A subcontract for the erection of the steel was given to the Bender Welding & Machine Co. of Mobile, Ala.

The subcontractor unloaded the steel from the railroad cars with an American oil-burning 20-ton steam crane equipped with a 90-foot boom. This unit was also used in the erection. An International flat-bed truck hauled the steel to the site and distributed it around the field; the truck was outfitted with an A-frame and a Tulsa winch for that purpose. The long-boomed crawler-type crane spotted the large members around near the particular footing where they were to be erected. In the erection two men worked on the ground, hooking the crane cable to the steel, while two connectors up on the structure strung the members together as the crane lifted them to position. The erection bolts and nuts were made only finger-tight as these initial connections were only temporary.

Structural-Steel Framework

The framework for the east and west stands is similar. But there are some slight structural differences in the west stand which contains a press box and broadcasting booth at the top and center. Incidentally the press box may be reached by an elevator that operates within one of the light towers. Steel columns for the stands range from 8-inch 24-pound H-beams to 10-inch 33-pound H-beams. They are cross-braced with diagonal struts, usually 4 x 3 x 1/4-inch angles. Column loads vary from 30 to 105 kips, the maximum load consisting of 35 kips dead load and 70 kips live load.

Steel rafters connect the tops of the columns on the radial lines; they generally are either 12-inch 25-pound or 14-inch 34-pound I-beams. The press-box floor, the highest point in the stadium, is 48 1/2 feet above the ground. The light towers, to illuminate the playing field for night games, are of course much higher. At each side of the rear of the stadium are 120-foot towers, one at the center and the others spaced half-way down the stand. They support a total of 120 floodlights, each a 1,500-watt narrow-beam unit with plain lens. At the back of each tower, 50 feet above the ground, are three 500-watt floodlights for illuminating the parking field.

The long rafters along the radial lines are in six different sections, each with a different slope so as to give the stadium a dish-shaped bowl-shaped effect. The stadium is entered by four ramps on each side, one at each end and the

other two along the center. The end ramps are 11 feet wide and the center ramps are 15 feet. They lead out onto a 15-foot-wide concourse under the stand and 11 1/2 feet above the ground. The heaviest members in the structure support this concourse framing which runs the length of the stand.

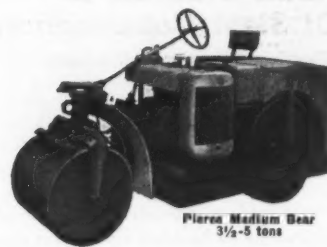
From this concourse ten ramps ascend slopes to openings or vomitoria in the stadium which are about 2 feet higher in elevation than the concourse. Each opening is 6 1/2 feet wide, runs the length of ten rows of seats, and has a 2 1/2-foot aisle on each side of it by which spectators may go up or down according to where they are seated. With 20 such roomy openings, a peak crowd of 30,000 will be able to enter and leave the stadium with the minimum of confusion or crowding.

Bolted Together

All field connections of the structural members are bolted together; no rivets or welding are employed in the frame-
(Continued on next page)

A Roller For Every Job

Sturdy, heavy-duty rollers, engineered to stand up under the toughest conditions. Pierce-Bear Tandem Rollers are powered by economical Allis-Chalmers 4-cylinder industrial type gasoline engines. Variable weights, from 3 1/2 to 5 tons with built-in water tanks for ballast and wet rolling.



Pierce Medium Bear
3 1/2-5 tons

The new 2 1/2-3-ton Pierce Baby Bear is designed for close-in work and small area maintenance. It works against a curb up to 25 inches high and within 1 1/2 inches of a higher wall or building. Final drive is within the rear roll. Use Pierce-Bear Tandem Rollers for all-around performance. Write for folder.



Pierce Baby Bear
2 1/2-3 tons

Pierce-Bear Rollers Lewis Manufacturing Company

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PROFITABLE PAYLOAD EVERY TIME!

HERE ARE THE REASONS

WHY!

- ★ 20% to 40% lighter than other buckets, type for type.
- ★ All welded construction for greater strength and durability.
- ★ 12% Manganese Steel chains, fittings, and reversible tooth points.
- ★ Full Pay Load every trip, even in wet digging.
- ★ Perfect Balance; handles easier, fills faster, dumps cleaner.
- ★ Three Types: light, medium, and heavy duty. **With or Without Perforations.**

HENDRIX Lightweight DRAGLINE BUCKETS

3/8 to 40 Cubic Yards

Every time you hook up a Hendrix "Lightweight" you're certain of a full payload in less time with greater ease. Hendrix Dragline Buckets are designed to increase your profits on any digging job and at the same time cut down your operating and maintenance cost. The strength of a solid mass is maintained, yet weight lessened, through a scientific arrangement of perforations. We took the weight out of the bucket to let you put it inside!

Write for descriptive literature or ask your dealer.

HENDRIX MANUFACTURING COMPANY
MANSFIELD INCORPORATED LOUISIANA

Football Stadium Is Of Steel Construction

(Continued from preceding page)

work. Three crews of two men each, known as bolt-and-nut gangs, put the structure together by removing the temporary erection bolts and driving the permanent bolts through holes already punched in the steel. The bolts are equivalent to $\frac{3}{4}$ -inch rivets and are a trifle oversize with respect to the punched hole so that they cut the metal slightly as they were driven. The bolts were then drawn up tightly with nuts. Each two-man crew was equipped with a Chicago Pneumatic hammer and an impact wrench driven by a Jaeger 105-cfm air compressor. The hammer is similar to a riveting hammer and drives the bolt while the wrench pneumatically tightens the nut on the bolt.

This method of erection saved considerably on labor since a two-man bolt-and-nut gang did the same work that a riveting crew would do. The riveting crew, however, would require four men—heater or passer, catcher, driver, and buckler. With the two-man crew, one drove bolts and the other tightened the nuts. They worked from a float 44 x 66 inches, constructed of plywood and suspended like a platform from the rafters by ropes.

Steel Welded Deck

The bolted structure remained somewhat limber until the steel deck seat plates were welded into position over the top of the framework, thereby stiffening the stand laterally. These deck plates are actually L-shaped sections made of 3/16-inch steel plate bent to form a seat step with a width of 2 feet 2 inches and an average riser height of 8 inches. The sections are 12½ to 15 feet long and weigh about 300 pounds each. These deck plates actually comprise about half the structural-steel tonnage on the contract. They constitute a remarkable steel fabricating job, considering the great number of pieces involved, because of the varying dimensions in a curving stadium structure.

Assembling the heavy plates in position for welding over the big stands was another problem, solved by the erectors with the use of a "Joe Magee" rig. The latter term is applied by steel workers to any improvisation of available equipment and materials to do a job quickly and economically. Stemming from some Bunyanesque character in steel erectors' folklore, a "Joe Magee" rig does not necessarily follow any set pattern of established tool design. The innovation is limited only by the imagination of its creator. In this case the problem was how to get the steel plates from the ground up to the level of the sloping rafters and distributed out over the steel framework.

Beginning at the bottom, the lower rows of seat plates were bolted to the rafters, and as the work progressed upward, steel angles were tack-welded to the plates 10 feet apart to form runners. From bottom to top of stand these runners were about 100 feet long. Two sheave blocks were then hooked up at the rear of the stadium, one at the ground and the other from the top cross member between the rafters. These blocks were at the mid-point of the runners. A two-point tie with a cable was then attached to four of the 300-pound plates at the bottom of the incline. The other end of the cable ran up the stand between the runners, through the sheave block at the top and bottom, and was hooked to a Jeep. As the Jeep moved away from the stand, the 1,200-pound load was easily and smoothly pulled upwards, riding on the angle runners. The plates were dropped off the incline where they were marked to fit into the steel layout. The runners were easily shifted along the stands as they were needed in a new location, and simply tack-welded in place as before.

Each length of plate has two lugs which are designed to interlock alternately with the plate above and below to form a solid step. The joints were then welded together, giving the structure additional rigidity. The welding was not done for the purpose of strengthening the stand but to make the deck waterproof. First a two-man welding crew went over the step plates. As one man pulled the plates together with a hooked bar, the other fitted the joints in line with tack welds every 12 inches. This was done along both the vertical and horizontal seams.

Then the joints and seams were fully closed with real production welding, using eight General Electric 300-amp electric welders operating off a special line run in to the job site. These openings were made tight enough to withstand a hose test; that is, no water dropped through when the stands were flooded. At the center of the stand the step plates provide 61 rows of seats; this tapers off to 50 rows at the ends. The spectators will not sit on these steel

plates, however. A wooden-board seat made of two 2 x 6's goes 6 inches above the step plate and is supported on steel brackets welded to the deck.

The steel plates came painted with a shop coat of zinc chromate so as to permit welding without causing noxious fumes. They were then covered with field coats of red oxide of lead and aluminum. Water runs off this waterproof surface down to the bottom of the stands where it flows into 8-inch drain pipes on 12½-foot centers, or in the middle of each bay. The stand drainage is carried off in a northerly direction to sewer lines on Virginia Street, the opposite direction in which the field itself is drained.

Each stand has two expansion joints in the steel framework, equally spaced and running in the direction of the rafters. At these joints two channels take the place of an I-beam as a rafter. A strip of copper is laid over the top of the channels under the deck plates which are left an inch apart for expansion. These joints are not

welded but are left open.

Around the rim of the stadium an iron railing of 2-inch pipe, 5 feet high, was built as a safety precaution. The openings between the pipe stanchions are closed with wire mesh. The aisles down the steps of the stands are covered with an $\frac{1}{8}$ -inch-thick wearing surface of Plastic Rock, a non-skid preparation designed to prevent people from slipping and falling.

Concrete Work

Even in this nearly all-steel stadium there are 2,500 cubic yards of concrete reinforced with 12 tons of reinforcing steel. The Orleans Materials & Equipment Co. of New Orleans, La., supplied the reinforcing steel. The truck-mixed concrete used on the project came from the Radcliff Gravel Co., Inc., of Mobile. Concrete, of course, was used in the footings and pedestals, as well as for paving the walks, entrance ramps, and the long concourses within the stadium.

In front of the stands is a 6-inch-
(Concluded on next page)

KOEHRING HEAVY DUTY

twinbatch

FOR MOST ECONOMICAL PAVING

- Can hit top output of 90 batches per hour on many jobs.
- Job-tested design. Heavy-Duty construction keep paving on schedule

Check these economy-production features on the 34-E *twinbatch*

- **Big, 10'-wide skip** for truck loading is fast-charging . . . hoists in only 8 seconds . . . large throat discharges almost complete load before skip is in elevated position.
- **Mix from 50 to 90 batches** per hour depending on specifications and job conditions. Positive air control by Batchmeter actuates transfer and discharge chutes . . . saves more seconds . . . is easy on the operator.
- **30° elevating boom** (optional) lets you pour wall foundations, footings, abutments for handy profits in addition to paving.
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- **Double-door boom bucket** dumps full batch instantly . . . travels by power as boom swings . . . can be dumped at any point along boom, for high-speed concrete distribution on the grade without loss of time.
- **Accessibility** of every maintenance point plus heavy-duty construction, protects your profits against costly down-time . . . keeps the 34-E *twinbatch* producing at peak efficiency.

* *twinbatch* — DUMPTOR — Trademark Reg. U. S. Pat. Off. K804

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thick concrete wall 4½ to 5 feet above the ground level, surmounted by a 2-foot-high iron handrail. At each line of columns the wall is supported on a spread footing. In front of this wall, and at the center of the stands, are double rows of box seats resting on concrete foundations.

The ramps and concourse have a ¾-inch concrete deck reinforced with alternate ¾-inch bent and straight bars. Forms for these pavements were made by running 2 x 6 stringers on 26-inch centers between the steel supporting I-beams and using 1 x 10's for the bottom form. The stringers were notched if the beam was too shallow to take their full depth; if the beam was too deep, a jackleg was put under the stringer to raise it to the top of the flange. Much of the form lumber was cut on a Monarch Uni-Point 16-inch table saw, and could be used four times at each of the four quarters of the stadium which are alike.

As the ramps come down to the ground level, the steel construction

gives way to 6-inch-thick concrete walls at each side of the ramp. The space in between was filled with sand and then covered with a concrete slab. Forms for these walls were made from 1-inch tongue-and-groove stock backed by 2 x 4 studs on 24-inch centers and double 2 x 4 wales on 18-inch centers. Snap-Ty form ties were spaced 18 to 24 inches in the walls. The space between the two walls carried 2 x 6 cross-bracing. The concrete was chuted into the forms from Rex 6-yard Moto-Mixers on Autocars. On the higher pours, such as the concourse and upper portions of the ramps, the concrete was discharged into buggies which were raised to form level on a Jaeger tower hoist. The tower could lift to 30 feet, but the maximum hoist on this job was only 14 feet.

Stadium Facilities

Under the west stand at ground level are dressing rooms for the two football teams playing in the stadium, also a dressing room for the officials. This

structure is of concrete masonry, and on the inside is a glazed tile wainscoting 5 feet up from the floor. Here also are two 85-gallon hot-water heaters and an 865-gallon hot-water storage tank to insure an adequate supply for the showers. Leading off from the concourse under the stadium are toilet facilities.

Two other Mobile firms had sub-contracts on the construction of the stadium which will cost around \$1,000,000. The John O'Donnell Electrical Co. did the electrical work, while the Lutz Plumbing Co. handled all the plumbing.

Personnel

A force of from 30 to 50 men was employed in building the Ladd Memorial Stadium. Personnel for J. P. Ewin, Inc., included J. R. Thrasher, Jr., Engineer; W. R. Manint, Superintendent; and H. R. Blackerby, Assistant Superintendent. B. F. "Slim" Hall was Superintendent for Bender Welding & Machine Co. which handled the steel erection.

River-Harbor Funds Exceed \$573,000,000

Congress and the President have approved the appropriation of \$573,242,200 for Federal flood control and river and harbor work during 1949. Of this sum, \$405,741,100 will be spent on flood control; \$166,989,100 for rivers and harbors; \$500,000 for alterations to bridges; and \$12,000 for the District of Columbia water mains.

The appropriation specifies that \$462,961,200 be spent for construction purposes; \$71,000,000 is available for maintenance, operation and care of the nation's vast network of ports and inland waterways; \$7,050,000 is for preliminary examinations and surveys of proposed improvements, and for contingencies; and \$5,242,000 is for advanced planning. Maintenance of flood-control projects is placed at \$3,220,000.

The construction funds will be spent as follows: \$325,908,100 on general flood-control projects; \$47,000,000 for the lower Mississippi and its tributaries; \$1,565,000 for the Sacramento River in California; and \$88,488,100 on rivers and harbors.

Congress specified that \$1,095,000 of the flood-control planning money be used for the following projects:

Eufaula Reservoir, Okla.	\$400,000
Gavins Point Reservoir, S. Dak. and Nebr.	250,000
Bear Creek Reservoir, Pa.	200,000
Lucky Peak Reservoir, Idaho	90,000
West Fork Reservoir, W. Va.	60,000
Whittier Narrows Reservoir, Calif.	50,000
Farmington Reservoir, Calif.	45,000

Funds are provided in the new fiscal year for construction work on 198 flood-control projects in 37 states. The \$47,000,000 construction funds included for the lower Mississippi River Project will be spent in Illinois, Missouri, Kentucky, Tennessee, Louisiana, Arkansas, and Mississippi. Other flood-control projects with appropriations of \$5,000,000 or more are:

Garrison Reservoir, N. Dak.	\$26,000,000
Fort Randall Reservoir, S. Dak.	18,000,000
Bull Shoals Reservoir, Ark. and Mo.	14,000,000
Wolf Creek Reservoir, Ky.	12,400,000
Buggs Island Reservoir, Va. and N.C.	9,000,000
Center Hill Reservoir, Tenn. and Ky.	9,000,000
Harlan County Reservoir, Nebr.	8,000,000
Missouri River Agricultural Levees (Iowa, Nebr., Kans., and Mo.)	8,000,000
Alatoona Reservoir, Ga.	8,000,000
Conemaugh River Reservoir, Pa.	7,875,000
Clark Hill Reservoir, Ga. and S.C.	7,700,000
Cherry Creek Reservoir, Colo.	7,000,000
Kansas Cities (principally levees and floodwalls), Mo. and Kans.	7,000,000
Fort Gibson Reservoir, Okla.	7,000,000
Bluestone Reservoir, W. Va.	5,713,800
Lookout Point Reservoir, Oreg.	5,000,000

Construction of rivers and harbors calls for \$88,488,100 to be spent on 79 projects located in 33 states and in Alaska. Among the important projects with appropriations of \$1,500,000 or more in the new fiscal year are:

McNary Lock and Dam, Columbia River, Wash. and Oreg.	\$22,000,000
Mississippi River, between Missouri and Ohio Rivers, Ill. and Mo.	9,000,000
Missouri River at Fort Peck, Mont.	3,700,000
St. Marys River, Mich.	3,000,000
Jim Woodruff Lock and Dam, Fla.	3,000,000
Missouri River, Kansas City, Mo., to Sioux City, Iowa	3,000,000
Morgantown Lock and Dam, Monongahela River, W. Va.	3,000,000
New York and New Jersey Channels, N.Y.	2,200,000
The Intracoastal Waterway, Galveston District, Texas	2,119,000
The Intracoastal Waterway, New Orleans District, La.	2,000,000
Missouri River, mouth to Kansas City, Mo.	2,000,000
Cleveland Harbor, Ohio	2,000,000
Neches-Angellina Rivers, Texas	1,818,100
Coos Bay, Oreg.	1,500,000

Earth-Moving Equipment

Catalogs on its line of hydraulically operated earth-moving equipment can be secured from the Be-Ge Mfg. Co., 855 N. Monterey St., Gilroy, Calif. Form 500-A describes the Be-Ge scraper wagons, dump wagons, land levelers, power-control units, and hydraulic cylinders. Form 3100-A is devoted exclusively to the Be-Ge scraper plane.


The catalogs discuss the operation of these units and their principal features, describe the power units for dragging them, etc. Photographs show the equipment in use, and tables list specifications and dimensions.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 11.

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for accurate surfaces finished fast, at low cost.

Roadside-Park Plan Pushed in Louisiana

Five Under Construction; Civic Groups Donate Land For Some Sites; Work Is Done by Maintenance Crews

RECENTLY the Louisiana Department of Highways decided to build roadside parks along its main highways. To acquire the necessary sites the Department sought the cooperation of other state agencies, the Federal government, local communities, and civic-minded groups interested in the program.

The Department realized that the civic groups and various organizations would be particularly interested in the creation of memorials to the dead of World War II. With this thought in mind, it invited these groups and organizations to participate in the program by securing suitable sites for roadside parks to be deeded to the Department, and then dedicated as memorial parks after the Department completed the construction.

The planting of trees as living memorials along the highways after World War II was not feasible as such plantings could not be maintained in the condition befitting the original intention. So attention was directed to the construction of small roadside parks where the work effort could be concentrated in one spot. By putting up a plaque notifying the public of the purpose to which the park is dedicated, highway officials feel that users of the facilities will be constrained to keep them in shape, and not permit them to become eyesores. For without the help of the public, the maintenance work at these scattered sites would be too big an order for the Highway Department to handle economically.

The first step, of course, was to obtain the necessary land, usually a plot of ground containing from 1 to 2 acres. Not any site picked at random would do for this purpose. Natural advantages were stressed in the selection, such as a stand of fine trees or shrubs, a stream, a lake, or a point of historical interest. On new construction the Department can now secure the necessary land for a roadside park by taking an easement along the right-of-way. A natural selection that lends itself readily to this extra strip of right-of-way is at the bridge heads of main stream crossings. The land can be acquired at the time of construction without too much difficulty, and such a site usually possesses all the natural advantages that are desired in a park.

Some of the large intersections on main highways which have been completed or are now under construction offer suitable advantages for roadside-park sites. In these triangles, islands, and circles, the trees have been left standing and a good opportunity is afforded to make some of the areas into roadside parks. Two of these intersections are north of Shreveport on State Highway 8 where a new highway is being built to connect Highway 8 with U. S. 71.

First Parks

Louisiana has a good model for its park program in the first roadside park built by the State Highway Department back in 1940 on U. S. 80 between Monroe and Ruston. This was constructed as part of one of the four specific roadside-development projects which were undertaken in that section at that time. The park site was purchased by the Department along with the additional right-of-way necessary to complete the roadside-development project.

The second park, in the extreme

northeastern corner of the state, is on U. S. 65 near Lake Providence in East Carroll Parish and about 15 miles south of the Louisiana-Arkansas line. It is on the banks of one of the most beautiful lakes in the state and where Tensas Bayou has its beginning. Both are lined with very old cypress trees. The site offers an unusual opportunity for tourists to fish and swim. The land was donated to the Department by the American Legion Post of the Town of Lake Providence, and consists of about 3 acres.

Its location is of great historical interest. In 1863 during the War Between the States, General Ulysses S. Grant had his army of approximately 45,000 men stationed in Louisiana on the levee of the Mississippi River between Lake

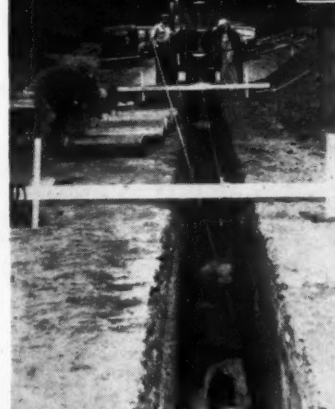
Providence and a point opposite the City of Vicksburg, Miss. Admiral Porter, who was cooperating, had his fleet of gunboats stationed in the river a few miles above Vicksburg. Previous efforts to capture Vicksburg had failed and General Grant decided to attack it from the south and east. In order to transport his men and supplies down

the Louisiana side of the river, and in order to furnish an inland waterway for Admiral Porter's fleet so that it would not have to run the gauntlet of the Confederate batteries which were protecting the Vicksburg heights, General Grant dug three different canals to turn the river into the various bayous.

(Continued on next page)



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FAST, CLEAN, ECONOMICAL

**7 to 24 inch width
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Pennies saved per foot of trenching assure more profit dollars per job!

Over fifty advancing speeds equip the one-man economical Badger Trench Excavator to operate in and on any kind of soil. Patented high speed shovels dig fast and uniformly... do not require an unwieldy, bulky machine to assure 'bite' or purchase. Reversible cross conveyor and trench shields keep waste away from trench. Overload safety clutch protects machine and prevents damage as the Badger digs forward or backward, over, under and around obstructions. Ball bearings on all high speed shafts and bronze or babbitt bearings on low speed high torque shafts assure long life dependability.

25 MPH ROAD SPEED

Model 202 with rear dual wheels offers cost-cutting mobility of twenty-five MPH road speed. Eight MPH is recommended speed when unit is equipped with tracks or half tracks. All Badger units are easily transported on 1 1/2 ton truck.

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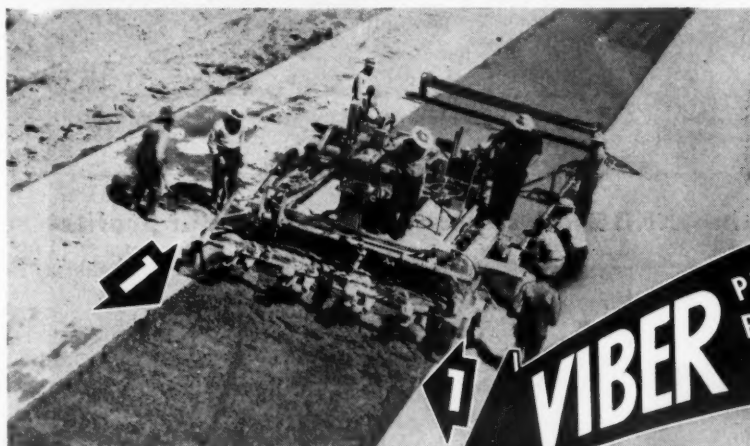
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A beautiful lake and a beautiful barbecue oven for the weary motorist—at the Lake Providence roadside park in Louisiana. The oven is made of firebrick and veneered with native stone. The grate was made by welding.

abandoned borrow pit on the site for a small lake.

Park Facilities

All the parks will contain similar facilities for the convenience of the public. A gravel parking area is provided, and wherever possible this has two drives connecting with the highway, one for an entrance and the other for an exit. These are laid out so as to get the cars well off the traveled way as easily as possible. The strip of park along the highway is generally blocked off with trees or a stone wall to discourage users of the park from leaving their cars on the shoulders instead of running them into the near-by parking field.

Water is provided from deep wells which are periodically inspected according to Board of Health regulations. Each park has either one or two shelters measuring 12 x 24 feet. They are made of cypress poles, whenever possible, cut in the neighboring woods, and topped by a rustic shingle roof. The floor is of



The shelters in Louisiana's roadside parks—like this one over a pump in the park at Lake Providence—are made of cypress poles whenever possible. Here the pump has been installed but not the rock around the foot of the pump.

gravel. From four to six picnic tables are in each park. Each consists of a 3 x 6-foot slab of concrete, 4 inches thick, supported on concrete legs covered with a veneer of native stone. Each

park has several fireplaces made of brick and stone.

The toilets are durable, fool-proof structures, which are made of rustic (Concluded on next page)

One was in East Carroll Parish and two were in Madison Parish. The East Carroll canal is within the limits of the Town of Lake Providence and can still be seen paralleling the main street. It connected the river with the lake, which in turn emptied into Tensas Bayou where the roadside park is now located. The Lake Providence canal as well as the other two in Madison Parish were military failures, since the Mississippi River began to fall and sufficient water could not be turned into them.

Four other parks are under construction this year. One in the western part of the state near DeRidder, on U. S. 171 in Beauregard Parish, occupies a site which was furnished by the City of DeRidder. Another park is near Homer in Claiborne Parish on U. S. 79 in the northern part of the state. It is on land which was purchased by the Women's Department Club and donated to the state.

The third park, the largest of them all, contains 7 acres. It is located at Fort Buhlow, 4 miles north of Alexandria on U. S. 165. This is another site of historical interest as it was a Confederate stronghold during the War Between the States. In fact, 2 of the 7 acres still contain the old gun emplacements and revetments. The site was under the jurisdiction of the State Department of Institutions, and was turned over to the Highway Department for use as a park. It is situated on a high bluff at a bridgehead of the Red River.

The last and most recent park site now under construction is located in the extreme southeastern part of the state at the intersection of U. S. 190 and U. S. 90 (Spanish Trail) just 4 miles west of the Louisiana-Mississippi State line and the Town of Pearlinton, Miss. This site has been owned by the Department for some time and consists of about 3 acres, all wooded with many large live oaks and other trees. It is in a section where artesian-well water can be had and it is intended to use an

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1405 Walnut Street, Kansas City, Missouri

Roadside-Park Plan Pushed in Louisiana

(Continued from preceding page)

wood and have concrete floors. They are equipped with a cesspool tank made of concrete, and measuring 5x5x5 feet deep with walls 6 inches thick. The inside is coated with asphalt waterproof paint. Following the pattern used by the Ohio Department of Highways, the tanks have a vent pipe but no overflow. They will have to be cleaned out only once every two years, as a little horse manure will be put in the tanks in the beginning to start the bacteriological action. This will tend to dissolve the solids.

Maintenance bridge crews are used in the construction of these roadside parks. They usually consist of a foreman and four men. The average cost of construction is from \$4,000 to \$5,000 per park.

Picnic Tables

In addition to the parks along the roadside, the Highway Department is placing single picnic tables along the main roads. These are located where a few trees afford some shade, and where the right-of-way is wide enough to permit the construction of a small gravel turnout so that cars can pull off the roadway. At large triangular intersections where more space is available, some picnic tables and fireplaces are installed. These waysides are too small to be classed as parks, but they do provide enough room for a motoring party to stop and rest and have a meal.

The roadside-park program of the Louisiana Department of Highways is under the direction of Torbert Slack, Roadside Development Engineer. The Department is now headed by Robert B. Richardson, Chairman, who was formerly Construction and Maintenance Engineer.

Break-Away Coupler For Hydraulic Hose

An automatic break-away coupler for use in hydraulic lines has been announced by the Ulrich Mfg. Co. of Roanoke, Ill. The company recommends it for use with drag-type hydraulic equipment and power units, and says it eliminates the problem of hose breakage.

The coupler's feature is a cable or chain which is attached to the hydraulically operated equipment and to the sleeve on the coupler. When equipment and power unit become separated, this cable pulls the sleeve back, causing the coupler to come apart. According to the manufacturer, the coupler will not shake loose or become detached on twists or turns until the sleeve is pulled back. Special sphere valves are designed to seal automatically both ends of the line when they come apart.

Ulrich explains that the coupler can be connected under pressure without using any tools; the coupler is locked in position by simply pushing the plug into the socket by hand. Other features

claimed include perfect seal when disconnected and almost no flow restriction when connected. The double-sphere valve principle is also said to eliminate turbulence and overheating.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 83.

Motor-Scraper Catalog

A 12-page booklet illustrating and describing the features of the Model TS-300 motor scraper is now available from LaPlant-Choate Mfg. Co., Inc., 2920 First Ave., Cedar Rapids, Iowa. This booklet shows many pictures of

the machine in action and of the various details of its construction. Booklet No. A1154 also contains a complete list of specifications, dimensions, and capacities.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 97.



The versatile cost-reducing Maintainer.

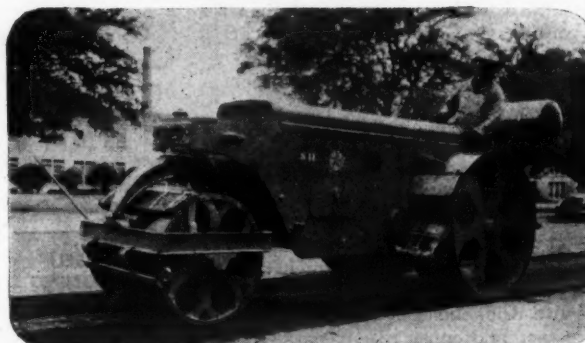
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Huber 3-wheel Rollers with speed and power to spare
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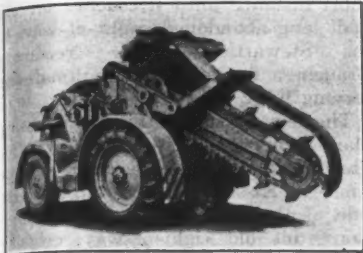
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A digging width of 5 to 7½ inches and a digging depth to 4 feet mark this new small ladder-type trencher, the Model No. 80 Trenchmobile.

Ladder-Type Trencher

A ladder-type trencher is announced by the Parsons Co. of Newton, Iowa—a division of the Koehring Co. First shown at the July Road Show, the Model No. 80 Trenchmobile has a digging width of 5 or 7½ inches and a digging depth of 4 feet. The unit is mounted on a rubber-tired carriage and is self-propelling. It can be moved under its own power, towed behind a truck, or loaded onto a truck or trailer without difficulty, the manufacturer states.

This utility-size unit has a wide range of operating and trenching speeds which make it a versatile and acceptable unit in almost any type of excavation within its range of digging widths and depths, Parsons points out.

The complete line of Parsons trenchers includes the fast-moving wheel-type Model No. 200 and three ladder types: the public-service Model No. 221; the general-purpose heavy-work Model No. 250; and the extra-heavy-duty Model No. 310.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 113.

Waterproof Sheeting

An impermeable sheeting for waterproofing and vapor sealing of buildings and structures is made by Rubber & Plastics Compound Co., Inc., 30 Rockefeller Plaza, New York 20, N.Y. It is described as an elastic, flexible material which contains no organic fiber base—such as vegetable fiber or mineral filler. Known as Nervastral Seal-Pruf, it is said to offer maximum moisture-vapor protection and to prevent condensation on interior sides of walls. It is also designed to protect against termites, as its chemical composition precludes termite nesting.

The Type No. 30 mat is 0.027 inch thick, 36 inches wide, and each roll is 72 feet long. The manufacturer states that, when tested, the No. 30 mats withstood a tensile stress of close to 300 psi with the grain, and over 265 psi against the grain; that heats of 428 degrees did not cause the material to flow; nor did it become brittle at temperatures down to a minus 10 degrees F. Melting point of the material is about 450 degrees F.

Nervastral Seal-Pruf is also made in two other sizes. The Type No. 10 is a thinner form for lighter duty. It is 0.012 inch thick, 36 inches wide, and 144 feet long. Type No. 60 is the heaviest form

in which Seal-Pruf is made. The manufacturer recommends it for use where there is an extreme water problem. It is 0.054 inch thick, 36 inches wide, and 72 feet long.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 51.

Generator Equipment

A catalog illustrating the range of Griffin High-Light generators is now being distributed by the Griffin Equipment Corp., 881 E. 141st St., New York 54, N.Y. This bulletin describes several of the standard Griffin units which are available, as well as special models designed to fit specific cases.

Among the units listed are the 1,500 and 2,000-watt ac or dc Series Q generators; the 2,000, 3,000, and 4,000-watt ac or dc Series 2-B-1; the Series BD-1 diesel-electric plant rated at 4,500 watts; and the Series BD-2 diesel-electric plant rated at 9,000 watts. Each of these series is thoroughly described,

with data on the models in which it is manufactured; type of wiring; kilowatt, kilovolt-ampere, and volt ratings; hp ratings; and dimensions.

A special pocket is included in pages 6 and 7 to hold future releases and data sheets. This section also contains some general information on ac and dc, and on common terms applying to generators.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 54.

Templates for Draftsmen

A series of templates for use by engineers, draftsmen, architects, and other designers, is made by Rapidesign, Inc., P. O. Box 592, Glendale, Calif. These plastic templates are made for a wide variety of uses. They include the Pocket Pal for drawing circles, hexes, deltas, squares, and other geometrical figures; the No. 401 ellipse set; the No. 201 detailer for drawing circles and side elevations of standard hexagon cap

screws, combined with a 9-inch engineers' scale and a 30-60 triangle; radius guides; templates for drawing standard symbols used in welding, electricity, fluid flow; and others.

A folder pointing out the features of each of these units is now being distributed by Rapidesign. It explains how they are used, the sizes in which they are made, the size units which can be drawn with them, the scales they contain, and other vital information. Each unit is illustrated and the price of each is listed.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 63.

Marion Representative

A sales representative for southern Indiana, western Kentucky, and southeastern Illinois has been named by the Marion Power Shovel Co. of Marion, Ohio. He is John W. Bishop. Marion distributor in the area is Shaffer & Co. of Brazil, Ind.



Here at last is a moil point designed to make maximum use of the power in modern paving breakers. Rockbit Sales & Service Co., pioneers in moil point design, have developed the new Sabur Point to break concrete more efficiently, more quickly, and more thoroughly than has been possible with conventional old fashioned moil points.

Photographs at left show the curved shape of the Sabur Point. As the point penetrates concrete, this curved shape causes a sideways shattering action through its wedge-like design, thus relieving the point for its main job of penetration. Here's how the Sabur Point works:



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Check the advantages of the new SABUR POINT:

- ✓ Scientifically designed to direct the force of impact.
- ✓ Saves money by breaking more concrete per man hour.
- ✓ Easy on the operator, less kick back. Practically impossible to stick.
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- ✓ Will far outlast other points even under the toughest conditions.

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Storm Sewer Built With Three Barrels

Concrete Structure Is 2½ Miles Long With a Maximum Section 54 x 14 Feet; Will Drain 6,300 City Acres

By WILLIAM H. QUIRK,
Eastern Editor

(Photos on pages 50 and 51)

✦ A HUGE concrete storm-water sewer 2½ miles long has been constructed in the Borough of Queens, New York City. It is composed of single, double, and triple-barrel sections, increasing in size with the direction of flow. Bigger than one of the Holland tunnels, the sewer at its maximum cross section measures 54 feet across its three barrels which are 14 feet high. Inside dimensions of the individual barrel are 16 feet wide x 10 feet high. Work on the project started in April, 1947, and was finished this summer. The sewer will drain approximately 6,300 acres in the north-central part of the borough which is located at the western end of Long Island.

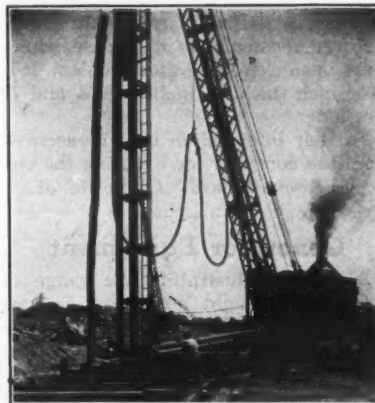
It is known as the Corridor Sewer, because it passes through a narrow strip of land which will eventually be developed as a public park and become a connecting link between three parks. The project serves the residential communities of Flushing, Flushing-Hillcrest, Flushing Heights, North Jamaica, and Auburndale, and some day will extend as far east as Oakland Hills. The design and construction of this sewerage system is under the direction of the Bureau of Engineering-Construction of the President of the Borough of Queens. The estimated total cost of the new work is around \$9,500,000. Of this amount the City will pay one-third, and the other two-thirds will be borne by property owners in the area of assessment. The project has been divided into eight separate contracts.

The new sewerage system has been sorely needed in this rapidly growing borough of New York's "white-collar" workers. During heavy rain storms this area of Queens has been repeatedly flooded, since the existing sewers were entirely inadequate to take care of the storm-water run-off. Many tributary

sewers, already constructed as combined sewers, had been restricted to sanitary flow only. Besides providing relief from flooding, the new sewer will open up approximately 10,000 more acres of land for development in this part of the borough, or enough area to house 700,000 people. A 39-inch sanitary sewer of reinforced-concrete pipe is also being built along the south side of the big storm sewer.

Sewer Design

The sewer runs on about an east-west line. Its west or outlet end empties into Flushing River in Flushing Meadow Park, the former site of the World's Fair. The river in turn empties into Flushing Bay, an inlet of the East River. Construction started at the west



A Bucyrus-Erie steam crane with a 60-foot boom and 50-foot swinging steel leads prepares to drive a timber foundation pile for the Kissena Corridor sewer. The rig is equipped with a Union No. 1½ steam hammer.

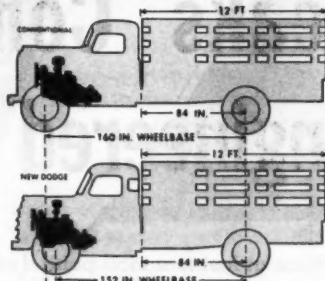
end and progressed towards the east, with the sewer gradually decreasing in size. From the river, the sewer follows the line of Avery Avenue for a

short distance until it reaches the old and long-abandoned right-of-way of the Stewart Railroad, Creedmore Branch, a former steam-railroad line serving Long Island.

The sewer sticks to this line, crossing Main Street and Kissena Boulevard in Flushing before crossing the wide expanse of Kissena Park. From the east side of the park the sewer continues along this old right-of-way, crossing 164th Street, Fresh Meadow Lane, Utopia Parkway, Horace Harding Boulevard and Cross Island Boulevard, until the end of the project is reached in Cunningham Park. Already at this eastern end a 3,000-family apartment-house project is being built by the New York Life Insurance Co. on land which formerly belonged to the Fresh Meadow Country Club at Horace Harding Boulevard and 188th Street. One of the contracts covers a lateral sewer to this development from the main line.

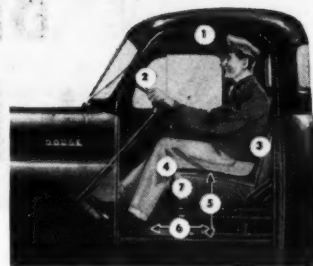
For about the western half of the job the sewer runs close to the bed of (Continued on next page)

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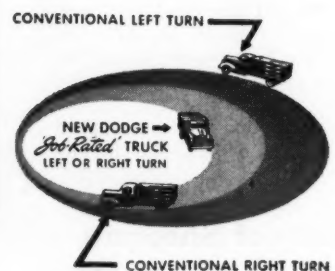
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a creek that flowed from Kissena Lake in Kissena Park to empty into the Flushing River. The meanderings of this ancient stream through a swamp had naturally discouraged any building in this corridor area over the years. But it also presented difficult subsoil conditions for the construction of a heavy reinforced-concrete sewer, which is said to be the largest of its kind in the world.

Consequently portions of the sewer have been built on timber piles, while other sections, where good soil was encountered in the subgrade, did not require this type of foundation. In some places, mud or poor clay 2 to 3 feet in depth had to be removed, and the area backfilled with broken stone or gravel to provide proper support for the structure. Where piles were not used or could not be driven, tests were made to determine satisfactory soil loadings. The computed weight of structure and fill was 2,000 pounds per square foot, and these tests were made for 4,000 pounds per square foot according to the manner prescribed by the New York City Building Code for soil-loading tests. Where piles were used, the design load was 15 tons per pile.

Reinforced-Concrete Structures

The triple-barrel and double-barrel Corridor sewers are rigid-frame structures of reinforced concrete, with the invert and roof designed as continuous members. The reinforcing steel is placed to provide for maximum positive and negative bending moments. As a rule, shear determined the thickness of the concrete in the inverts and roof. Double rows of vertical reinforcement were placed in the walls to provide for positive and negative bending.

In sections where piles were necessary, the invert was thickened an additional 6 to 9 inches, and the reinforcement was altered to allow the loads to be transmitted to the piles. Essentially, two designs were provided: one for sections of sewer covered with backfill not exceeding 15 feet, and the second to support fills above 15 feet and up to 30 feet. Eventually this whole strip of ground through which the sewer is constructed will become Corridor Park, extending from Hillside Park on the east to Flushing Meadows Park on the west, passing through Kissena Park on the way. Because they were built to the proposed park grade, the many manholes rising from the roof of the structure now tower into the air. In these contracts a 4-foot fill is placed on top of the sewer extending out beyond the side walls. From there it drops on a 1½ to 1 slope to the existing surface. The Park Department will complete the fill to the future level later.

In the triple-barrel 16 x 10-foot sewers, the two inner walls are 16 inches thick while the outer walls are 18 inches. The roofs are 20 inches, while at the invert the concrete is from 16 to 21 inches thick, depending on whether or not piles were used. The "dish" of the invert is 18 inches. Dimensions in the double-barrel sewers vary, as the sizes of the openings diminish as the line moves eastward. From 16 x 10 the barrels drop to 14 feet 9 inches x 10, 11½ x 9, and finally to 11 x 8. Single-barrel sewers also have varied dimen-



C. & E. M. Photos
Sheeting 3 x 12 inches is being driven for the 39-inch sanitary sewer built alongside the Kissena Corridor storm sewer. A McKiernan-Terry No. 3 air hammer, hung from the 70-foot boom of a Northwest crane, does the work. It is powered (close-up at right) by a Worthington 315-cfm air compressor.

sions which include the following sections: 11½ x 6, 10 x 10, 10½ x 8½, and 8 x 8. The thickness of the walls, roof,

and invert also decreases with the smaller-size barrels.

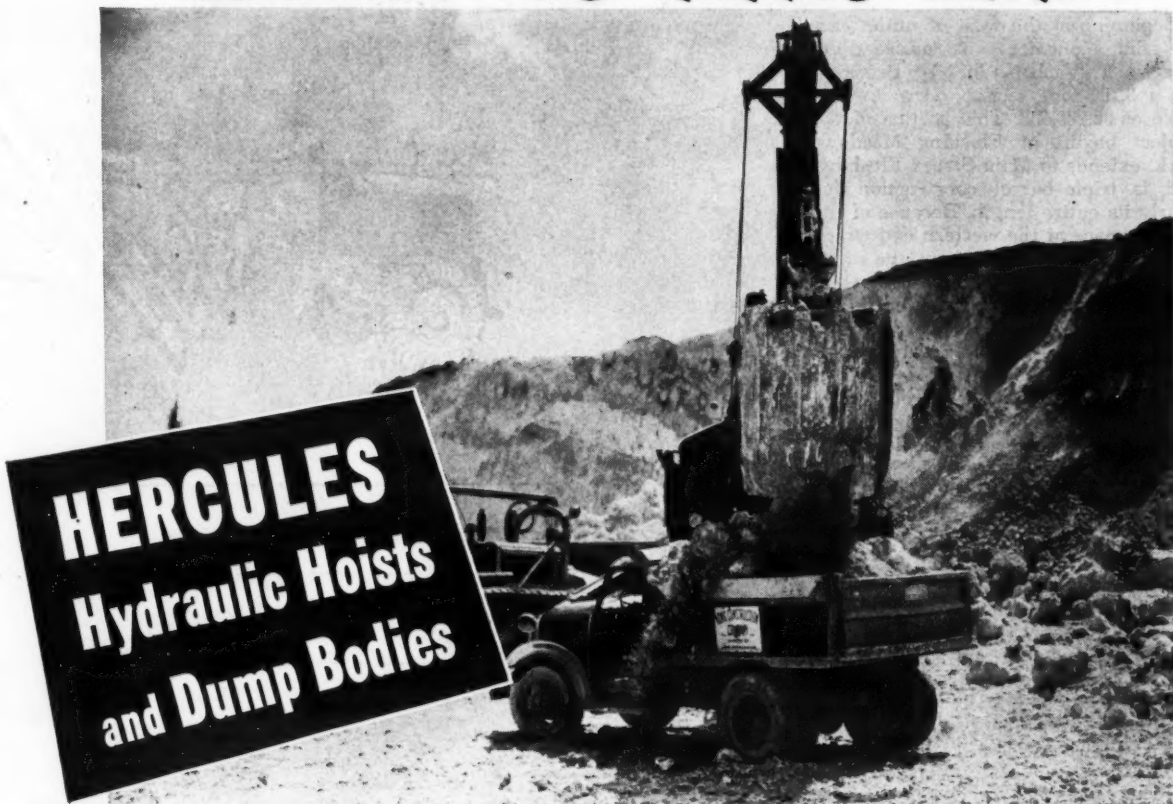
At frequent intervals 4-foot-wide

openings 8 feet high were left in the walls between the barrels to act as equalizers of the flow of water through the sewer. Every 150 feet a manhole was built over the structure. With the three-barrel sewer, the manhole is located on one of the interior wall lines, with every other manhole on the same line. Every 450 feet cleanout manholes were constructed, one for each barrel, so that in a triple-barrel section there are four manholes across the structure at that location. Correspondingly the double-barrel sewer has three manholes at the same interval, two cleanouts and one for entrance. The manholes are 4 feet square inside. When over 9 feet high they are built of concrete; under 9 feet they are of brick construction.

The grade on the sewer is 0.0008 foot per foot, or a drop at the rate of 1 inch in 100 feet. This insures a minimum velocity of 2.6 feet per second, which is enough to carry along solids which might otherwise be precipitated and hinder the discharge.

(Continued on next page)

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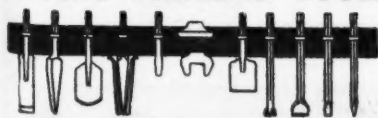
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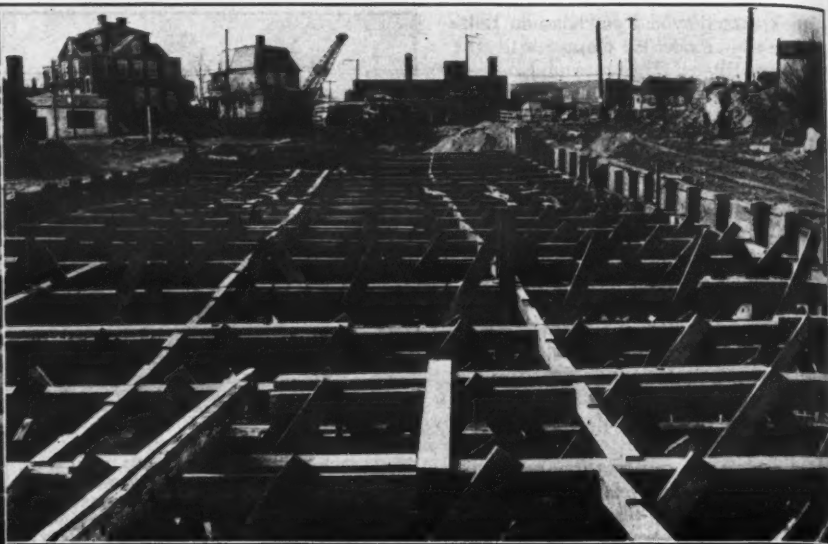
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Here are two views of timber sheeting and cross-bracing which Vachris, Inc., set up at Lawrence (left) and Blossom (above) Streets where a triple-barrel sewer section passes under heavy underground facilities. The temporary trestle (left photo) on top of the cross-bracing was built to carry an old sewer until the new one was completed beneath.

Storm Sewer Built With Three Barrels

(Continued from preceding page)

Many Contracts

Beginning at the west or outlet end, the first contract was awarded to Charles F. Vachris, Inc., of Brooklyn for a 3,100-foot section on a low-bid price of \$2,286,532. This portion of the project begins at Flushing Meadows Park, extends to Main Street, Flushing, and is triple-barrel construction for nearly its entire length. Because of the limited space at the western end which goes through a narrow street, the storm sewer divides into a double barrel in Avery Avenue and single barrel in Fowler for its final 1,310 feet before it discharges into Flushing River.

Contract 2 was awarded to Delhan Construction Co., Inc., of Brooklyn. It covers 3,460 feet, continuing on to Kissena Boulevard, with a triple-barrel sewer. The bid amount was \$2,237,426.

Contract 3 went to Tully & DiNapoli, Inc., of Long Island City, N. Y., on its low bid of \$2,499,333. This is a double-barrel section 5,785 feet long.

Contract 4 is about half double and half single-barrel construction for its 1,851-foot length, and was built by Gull & DeFelice, Inc., of Flushing for \$542,928.

The first section to be finished was Contract 5 by Spearin, Preston & Burrows Co. of New York City, which completed its 4,400-foot lateral last December. This 13 x 6-foot single-barrel sewer runs from the New York Life Insurance Co. Fresh Meadow Housing Project to the main sewer. The low-bid price was \$695,481.

The most easterly section, 4,100 feet long, is a single barrel 7½ x 6½. It was awarded to Hendrickson Bros. of Valley Stream, Long Island, on its low bid of \$595,449 for Contract 6.

Charles F. Vachris, Inc., also has another contract on the project for \$437,441, to build 950 feet of connecting sewer, adding a third barrel to a double-barrel existing sewer at the west end of the line. While the east-west length of the project is 2½ miles, more than that distance of sewer line has been constructed when connections and laterals are included. It is simpler and more economical to build these laterals now, before the area has been built up to the park grade, rather than to excavate after the fill has been made.

In some areas the excavation was fairly shallow, while in other locations, such as at the eastern end, cuts of 45 feet were required. In passing under some of the Borough's main thoroughfares deep cuts and heavy shoring were necessary, while detours also had to be provided. The flow-line elevation strikes a low of minus 7 at the outlet

(Continued on next page)

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in Flushing River with reference to the Queens datum in which mean high water is zero. Ground water was encountered at elevations ranging from plus 2 to plus 22; this necessitated the use of wellpoints to dewater the ground so that construction might proceed. At one location it was necessary to lower the ground water 16 feet.

Sanitary Sewer

The 39-inch reinforced-concrete-pipe sanitary sewer that runs along the south side of the storm sewer is generally located with its center line 5 feet off the larger structure and 5 feet below it. In places this pipe line, in 8-foot lengths, also is supported on two-pile bents. The sanitary line flows west to a pumping station near the end of the new sewer, where the discharge is raised to an existing sanitary sewer. This latter sewer leads to Tallmans Island sewage-treatment plant at College Point on the East River. The plant has a capacity of 40,000,000 gallons per day.

Vachris Contract

The section at the west end of the project, constructed by Charles F. Vachris, Inc., included all the problems that were encountered on the other contracts. It also involved the maximum section of triple-barrel sewer. The ingenuity of the contractors and engineers on this and the other sections was brought into play when other underground facilities lay across the path of the new sewer. These lines—including sewers, water mains, gas mains, electric and telephone duct lines—were supported across wide excavations as the new sewer was built beneath them.

On the Vachris contract, an old brick and masonry tunnel of the Stewart Railroad was discovered during the digging and had to be blasted apart. The tunnel was near Lawrence Street where the deepest cut on this section, 37 feet, was required. The Flushing-Ridgewood trolley line runs along Lawrence Street, but the streetcars were forced to stop at this point when the rails were removed as the sewer excavation crossed the street. Buses gave shuttle service for the 1½-mile remainder of the line into downtown Flushing. Detour roads were constructed and maintained at this and other prominent cross streets, or temporary bridges were erected.

Over the western portion of the project the soil was poor, made up mostly of alluvial deposits of soft gray clay saturated with water. Timber piles were essential in this material. Generally a good brown sand was found below the levels of the mud, gray clay, and fine gray sand, and provided excellent support for the piles. In some areas hardpan was encountered below the undesirable strata; this resulted in some brooming of the piles, and necessitated the use of steel shoes on the pile tips.

In other sections where a sand-gravel material was present, piles were not required, but heavy saturations of ground water were met at the lower portions of the cuts. Vachris, Inc., used Moretrench wellpoint systems to dewater the ground, employing about 1,000 feet of 8-inch header line to which 2-inch risers, 18 feet long, were attached at 5-foot spacing. Usually about 300 feet of header was set up in a particular location, with a Moretrench 8-inch pump for each line. Auxiliary pumps on the job included a couple of Rex 4-inch models, and a Jaeger 3-inch pump. The water was pumped into near-by existing sewers.

Excavation and Pile Driving

When enough space was available, as was the case over the majority of the line, the cut slopes for the sewer excavation were shaped and no sheeting was required. For the digging, pile driving, and concrete-bucket handling, Vachris, Inc., brought to the job six Northwest

cranes. Two were equipped with 70-foot booms, two with 60-footers, and two with 40-footers. In addition the contractor had three truck cranes—two Lorains and a Northwest. Dozing was done with three Caterpillar tractor-dozers—a D8, a D7, and a D6. Haiss drag buckets and Owen clamshell buckets, both 1¼-yard size, were customarily hooked up with the rigs for the excavation work. The material dug out was stockpiled along the sides for use later as backfill on top of the sewer. Or, where there was an excess, it was used to fill in the low-lying meadow lands adjoining the sewer. In a few locations tractor-scraper combinations also assisted in the big trench excavation.

In sections limited in width, such as where buildings or other structures are close by or at street crossings, sheeting was used to support the sides of the trench. The maximum trench width in those locations was 65 feet. Steel 12-inch 65-pound H-beams were driven

(Continued on next page)

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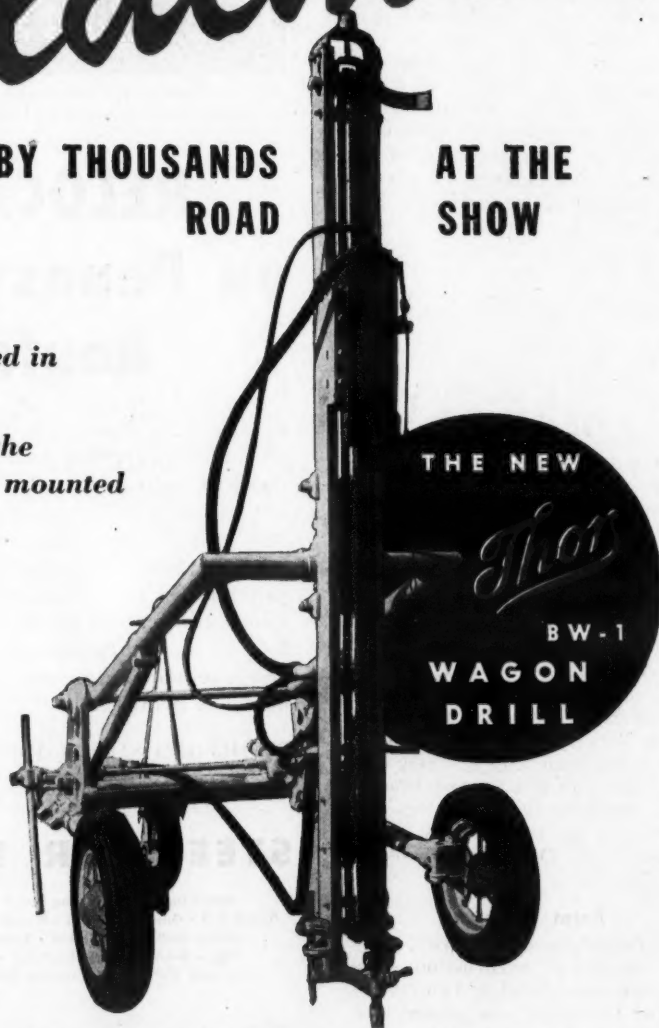
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Storm Sewer Built With Three Barrels

(Continued from preceding page)

on 8-foot centers along each side of the trench. Behind the flanges of the beams, 3 or 4-inch horizontal sheeting boards 8 feet long were inserted to support the sides of the trench. For cross-bracing 12 x 12 timber struts were used across the trench on 10-foot centers. Three or four such struts in a vertical plane were required in the deeper cuts. The excavation proceeded along with the sheeting, generally in 10-foot lifts.

Both the steel H-beams and the reinforcing rods used in the sewer were supplied by the Bethlehem Steel Co. from its Sparrows Point, Md., plant. The material was shipped by rail to the Avery Avenue siding of the Long Island Railroad, North Shore Division, adjoining the contract. From there trucks moved it out to where it was needed. Pile driving, both the steel H-beams and the timber foundation piles, was done by Marion and Bucyrus-Erie steam rigs equipped with 60-foot booms and 50-foot swinging leads. They employed either Union No. 1½ or Vulcan No. 7 hammers on the H-beams, and McKiernan-Terry 9B3 hammers on the timber piles. The driving rigs worked directly in the cuts, supported on double sets of timber, pontoon mats placed on the mud.

The timber foundation piles under parts of the sewer have 6-inch tips, 12-inch butts, and are from 18 to 50 feet long with the average around 25 feet. The average spacing is 3 feet on centers both ways. In the triple-barrel sewer the pile bents contain 16 piles per row. Near the tops of the piles, 3 x 12 wooden clamps were bolted to both sides of the piles in each bent to support a wood decking made of 3-inch planks. The heads of the piles project 6 inches above the decking, and this portion is encased in the concrete invert of the sewer. The deck served as the bottom form for the invert. No bottom form was used in the other parts of the sewer where there are no piles. There the invert was poured either on the natural sand or gravel foundation, or on a 6-inch course of broken stone.

In constructing the sanitary sewer alongside the storm sewer, wooden sheeting was also driven along the trench side. The sheeting consisted of 3 x 12's, 20 feet long, driven by a No. 3 or No. 5 McKiernan-Terry air hammer. Any one of three compressors supplied the air—an Ingersoll-Rand 500 or 315-cfm, and a 315-cfm Worthington. The hammers were usually handled by one of the Northwest cranes. The sheeting was strengthened by two stages of 12 x 12 wales, with 12 x 12 cross-bracing down the trench on 10-foot centers. The concrete pipe for the sanitary sewer was supplied by DiPasquale Bros. of Garden City, Long Island.

Form Work

Two different types of forms were used in the sewer construction since the concrete was placed in two operations. First the invert was poured to a level 6 inches above the spring line, and then the side walls and roof were poured in a second operation to complete the structure. Outside forms only were used in the invert. To form the curved invert base, screed irons bent to the radius of the invert were placed on 10-foot centers. These fabricated templates were hung from the wooden curb forms, and the concrete was screeded with a wooden screed between each two irons. Any slight deviation in the surface was corrected by hand finishing, after which the concrete was given a smooth steel-trowel finish. The form work and the concreting were done in 40-foot monoliths. The two rows of steel reinforcing at each wall

extended upwards out of the first pour.

For the outer side of the outside walls, wood forms of 1-inch stock were used. They were backed with 2 x 6 studs on 12-inch centers, and with double 2 x 6 wales on 42-inch centers. Mayo steel forms, ¼ inch thick, mounted on a carriage that moved on rails, were used for the rest of the structure. Each barrel had a separate form, 40 feet long, shaped exactly to the inside dimensions of the walls and roof of the sewer. Richmond Tyscrus on 2-foot centers held the outside wooden form securely in place to the inner steel form, assuring the proper wall thickness.

After the invert concrete had hardened and its forms were removed, the rails were laid for the collapsible steel forms. The small tee rails were spiked to 4 x 6 runners which were carried on 4 x 8 ties placed on 32-inch centers. The rail gage in the large three-barrel section was 8 feet 2 inches. Two carriages, each with four double-flange wheels, supported the 40-foot form sections. Each carriage had four ver-

tical and four horizontal jacks to raise and expand the roof and sides of the forms to their exact position. Hinges in the upper corners of the forms permitted this movement, and when they were in place the hinges were fastened securely with pins.

Concreting Operations

When the forms were oiled and the reinforcing steel tied in place, the concrete pours were begun. The design required concrete with a strength of 1,600 psi at 7 days, and 3,000 psi at 28 days. Truck-mixed concrete was purchased from the Colonial Sand & Stone Co. which has a commercial batch plant in Flushing about a mile from the job. On an average, six truck-mixers holding 9 yards each were used during a pour. Dragon cement went into the mix at the rate of 6 bags per yard. Water was added only when the truck-mixers reached the project, and the mixing then continued for about 5 minutes.

Haul roads were built along the sides

of the excavation for the truck-mixers to reach their destination. The pouring was usually done from both sides at the same time. For some of the double-barrel pours the concrete was discharged into chutes which emptied into hoppers equipped with elephant-trunk pipe. But most of the concrete placing, including all of the three-barrel work, was done with bottom-dump buckets handled by cranes, usually one on each side of the sewer. Bucket sizes ranged from one-yard up to a Wiley 2½-yard model. Mall vibrators were used to get a denser mix.

As the inverts were poured, eye-bolts were inserted in the center of each barrel near the end of the section. These came in handy later after the rest of the monolith was poured and the steel forms were ready to be moved ahead. A ½-inch cable about 150 feet long was attached to the front of the form, threaded through the eye-bolt in the invert, and then hooked to a tractor upon the bank haul road. When the

(Continued on next page)



Old road made hairpin curve (center background), then curved again before reaching existing bridge. Here work on second abutment is under way.

RELOCATION on Pennsylvania's Route 29

In the interest of safety, the Pennsylvania Department of Highways recently authorized two miles of relocation on picturesque Route 29, highway running north from West Chester. Located in the Ziegler-Schwenksville area, the project eliminates a narrow, outmoded bridge in a winding section of road by providing a new bridge with straight approaches. These scenes show phases of the construction, handled by John F. Keelor, Perkiomenville, Pa. Structural steel, bridge reinforcing, bar mats and dowel units were furnished by Bethlehem.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

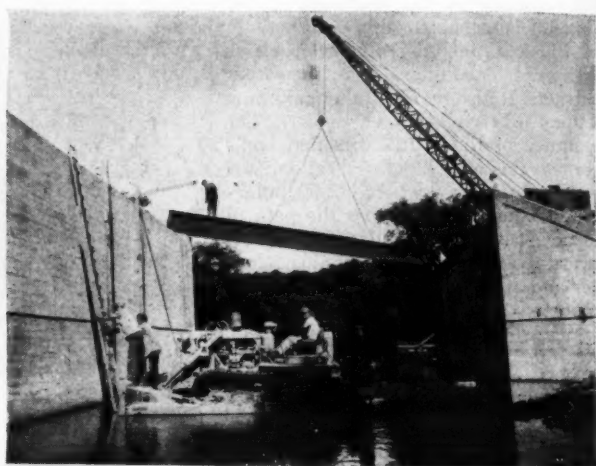
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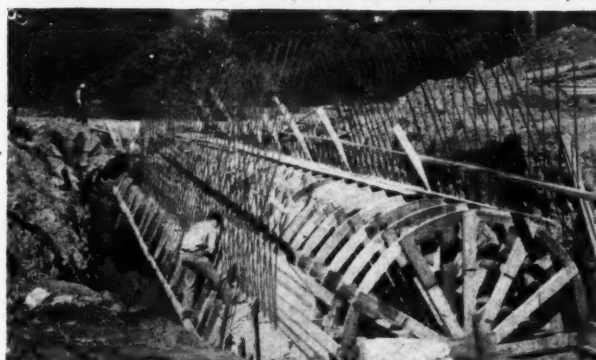
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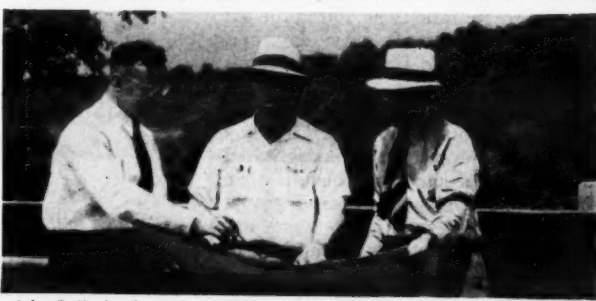
Completed bridge ready for traffic. Structure has 180 tons of structural steel, more than 50 tons of reinforcing steel.



Bethlehem Structural Steel goes into place between abutment and center pier.



Bethlehem Reinforcing Bars shown in place in one of three new culverts.



John F. Keelor (center), contractor, discusses project with A. J. Bedard (left), assistant district engineer, and Elwood Hummel (right), assistant district construction engineer, both of Pennsylvania Department of Highways.

form was collapsed it was easily pulled out from beneath the concrete, and was ready to be set up in another location. Eye-bolts far enough ahead of the section just completed were used so that the form came out straight without damage. When no longer needed, the eye-bolts were burned off with a torch.

With this type of form and construction pattern, different kinds of work were going on at the same time over the whole length of the contract. On the 40-foot monolith sections an invert pour averaged about 4 hours, and the roof and side walls took about the same time. Working an 8-hour day 5 days a week, the best week Vachris, Inc., experienced on concrete was when 120 feet of invert, wall, and roof sections was poured on a triple-barrel sewer, besides readying some forms for future pours. Roof forms were kept in place at least 36 hours before they were moved ahead.

The Mix

Concreting continued all through last winter whenever the temperature rose to at least 20 degrees F. Under such cold weather conditions the aggregate was heated, and the water was raised to 180 degrees F by means of steam pipes at the batch plant. Type 2 sulphate-resisting cement was employed which gives off a greater heat of hydration than ordinary cements, the actual temperature of the concrete being 30 degrees higher than the surrounding air. Tarpaulins stretched across the reinforcing steel protected the invert pours. They were also draped over the roof and walls during the rest of the work, while coke-burning salamanders were used in the barrels of the sewers during the curing period. The manholes served as chimneys. The absence of thin walls in the structure also lessened the danger of freezing.

During the hot summer the concrete was cured either by soaking it down with water, or covering the roof with a dampened backfill. In the winter the roof was covered over with salt marsh hay and with tarpaulins on top of that.

The weights of a typical 9-yard batch of concrete were as follows:

Cement	5,076 lbs.
Sand	11,790 lbs.
Stone or gravel, ¾-inch	17,892 lbs.
Water	225 gals.

The concrete slump for invert pours was 1½ inches, while for walls and roof pours the maximum slump was 3 inches. Concrete of low slump was effectively handled because of the thick walls and the relatively large spacing between the reinforcing bars. Vibrating also helped to secure a dense concrete of high strength.

Three standard 8 x 16-inch concrete cylinders were taken from each pour and sent to the laboratory for compression tests. At 28 days, compressive strengths as high as 8,300 psi were obtained from some of the cylinders. The strengths, however, usually ranged between 4,000 and 4,500 psi for the test cylinders, which was well above the required 3,000 psi.

Inspection was maintained in the batching plant to insure that the right amounts of materials were used, and that the quality of the cement and aggregates was maintained according to the specifications. Samples of cement, sand, gravel, and broken stone were taken at regular intervals, and sent to the President of the Borough of Queens testing laboratory for analysis.

Underground Obstacles

At both Blossom and Lawrence Streets in Flushing, the big triple-barrel sewer passes under other heavy underground facilities. Special shoring in the form of wooden trusses was used in the 65-foot-wide trench that ran for 200 feet between the two streets. Steel H-beams were driven along the sides and wooden sheeting installed as previously described. Then wooden trusses



C. & E. M. Photo

A Jaeger 9-yard truck-mixer on a Diamond T truck delivers concrete for a roof and wall pour on a 3-barrel section of the new sewer in Queens. A Wiley 2½-yard bucket, swung by a Northwest crane with a 70-foot boom, places the concrete in the forms.

were erected, spanning the trench on 10-foot centers. The top and bottom chords were first set in place, and then the other members were added. The chords were built from 12 x 12's,

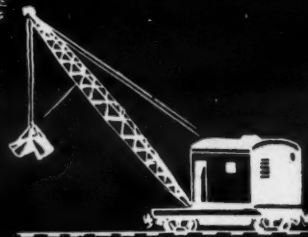
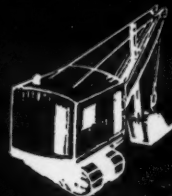
and as full 65-foot lengths were not available shorter sections were used. These were spliced with 3 x 12's, at least 8 feet long, one on each of the four sides. The chords were lifted into

place by the crane and butted against the sides, with wedges inserted as necessary. The top chord was just below ground level, with a 7½-foot clear height between the top and bottom chords which were built with a 3-inch camber. The cross members were 3 x 12's, 12 feet long, and 10 to a side. Excavation to the full 40-foot depth then proceeded between the trusses by means of the cranes and clamshell buckets.

At Blossom Street the triple-barrel structure passes under an existing 7-foot concrete sewer built on a cradle, and also under a 20-inch cast-iron water main. To carry the old sewer a temporary trestle was erected across the cut. Three bents of two 65-pound 12-inch steel H-beams 40 feet long were erected, with the beams in the bents 15 feet apart. Other H-beams were welded to the tops as caps, and similar structural members were used as stringers. At 4-foot intervals 12 x 12's were laid between the stringers. From

(Concluded on next page)

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Storm Sewer Built With Three Barrels

(Continued from preceding page)

each of these timbers 3-inch steel straps were hung to support a 48-inch-diameter spiral-welded steel pipe which was placed there temporarily to take the flow of the existing concrete sewer which was then removed. The water main was also suspended in similar fashion.

After the new structure was completed, concrete crossovers were constructed on top for the existing facilities. Backfilling over the contract was done by the cranes, draglines, scrapers, and trucks.

Items and Personnel

Quantities, such as so many cubic yards of excavation, yards of concrete, or pounds of reinforcing steel, are not given in the Bureau of Engineering-Construction contracts. Time is saved in the estimates by listing only the linear footage of the type of sewer required, number of manholes, etc. Payments to the contractor are made on that basis also. Contractors can readily compute the quantities required if they wish, by taking the cross-sectional area—say of a triple-barrel sewer—from the plans and multiplying that by the length required of that type of construction.

Charles F. Vachris, Inc., of Brooklyn employed an average force of 170 men on its contract under the direction of the following supervisory personnel: Anthony Troy, Superintendent; John J. Picone, Assistant Superintendent; and Leonard Vaccaro, Engineer.

Francis P. Keegan, Section Engineer, was in charge of the construction of

the entire 2½-mile sewer project for the Bureau of Engineering-Construction, Division of Sewers, of the President of the Borough of Queens. He was assisted by John Cullinane, Assistant Section Engineer. Each contract is also represented by a Resident Engineer; on the Vachris, Inc., contract that post was occupied by Andrew McGrattan.

The Division of Sewers is headed by William H. Bertram, Chief Engineer, assisted by Walter Donohue and Martin Nelson. James A. Burke is President of the Borough of Queens, and Maurice Fitzgerald is Borough Works Commissioner.

Axial-Flow Pump Is Corrosion-Resistant

A large capacity axial-flow pump said to be resistant to contaminated sea water and other corrosive liquids is announced by Economy Pumps, Inc., Hamilton, Ohio. It is especially suited to condenser circulation and other services requiring low-cost high-speed pumping of large volumes of liquids, the manufacturer says. These pumps are best fitted for applications where any variation in head is a reduction, and where the resultant increase in capacity is not objectionable.

The impellers and suction bells are cast from a 25-per-cent-chrome and 12-per-cent-nickel stainless steel. The pump shafts are made from 18-8 stainless steel. Column and discharge elbows are formed of a high-test cast iron containing approximately 2 per cent nickel.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 65.

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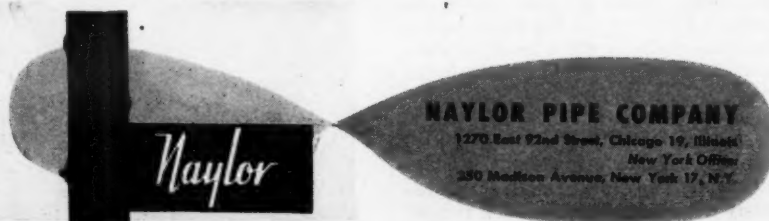
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Convention Calendar

Sept. 19-24—AASHO Meeting

Annual meeting, American Association of State Highway Officials, Utah Hotel, Salt Lake City, Utah. Hal H. Hale, Executive Secretary, 1220 National Press Bldg., Washington 4, D. C.

Oct. 2-10—Construction Exposition

Construction Industries Exposition, Houston Chapter, Associated General Contractors of America, Inc. L. W. Duddleston, General Manager, or Russell W. Nix, Chairman, Exposition Committee, AGC Office Bldg., Gray and Crawford Sts., Houston, Texas.

Oct. 13-15—ASCE Meeting

Fall meeting, American Society of Civil Engineers, Statler Hotel, Boston, Mass. Col. William N. Carey, Executive Secretary, 33 W. 39th St., New York 18, N.Y.

Oct. 19-20—Safety Congress

Construction Section meetings, National Safety Congress, National Safety Council, Hotel Stevens, Chicago, Ill. R. L. Moore, Senior Engineer, Construction Section, 20 N. Wacker Drive, Chicago 6, Ill.

Bibliography Prepared On Frost Action in Soils

A list of reference material on frost action in soils has been compiled by the Highway Research Board of the National Research Council.

The material listed in the bibliography is divided into three main sections. In the annotated-bibliography section, the references are listed chronologically, and include the author, the publication in which the article is found, and a short résumé of its content. Another section of the bibliography identifies the authors alphabetically; and a third section lists the subjects covered in alphabetical order. A review and digest of the references given in this bibliography are now in progress and the Board plans to have a report available later in the year. This digest of published literature on the subject is designed to eliminate duplication of past efforts, and to speed subsequent research.

Copies of the 57-page bibliography can be obtained by writing to the Council at 2101 Constitution Ave., N. W., Washington 25, D. C. Price: 45 cents.

AISC Meets in New York

The engineering staff of the American Institute of Steel Construction, Inc., recently held its annual meeting at the Hotel Commodore in New York City.

A highlight of the meeting was a special luncheon to which members of the press were invited. L. Abbett Post, Executive Vice President, acted as host, and spoke on the use of structural steel to build retail stores. T. R. Higgins, Director of Engineering of the Institute, reported that a revision of building codes could save considerable sums of money. For instance, he reported that the City of New York could save upwards of \$5,000,000 annually if its code were revised in accordance with the standards used by other major American cities which have adopted the

AISC's standard specifications for steel construction.

Jack Singleton, Chief Engineer, then introduced each of the district engineers, who gave brief reports on the territories they cover, and the general business conditions in those areas as they pertain to the steel industry and its outlook.

Catalog on Sand Spreader

A folder describing the Champion Handy spreader has been prepared by the Good Roads Machinery Corp. of Minerva, Ohio. These spreaders are designed for hitching to the back of a dump truck, and can be used for spreading sand, slag, gravel, or other

road-building materials. The folder illustrates the unit's hitch, hopper, gear box, safety platform, etc. It also describes the caisson-type trailer for transporting the Good Roads spreader to and from the job.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 126.



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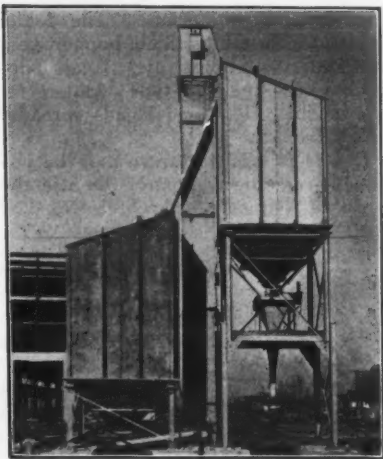


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The new Blaw-Knox portable bulk-cement batching plant, shown here with an auxiliary bin, has been designed for utmost portability and speed of erection or dismantling.

Bulk-Cement Plant Features Portability

A new portable bulk-cement batching plant has been announced by the Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh 22, Pa. It features improved portability and the use of an auxiliary bin to permit easy expansion of the unit's capacity.

A long under-track screw feeder—20 feet 6 inches from hopper bottom to elevator—is designed to enable either the immediate or eventual installation of a low-level auxiliary bin on the car-unloading side of the elevator. An overflow chute passes cement from the main or batching bin to the auxiliary bin. This auxiliary bin has a slide gate for passing material to the screw feeder, and thence by elevator to the main bin.

The entire bin section is a one-piece welded assembly. The cement-weighing batcher is supported from the steel platform framing of the middle unit, which is also shipped and erected in one piece. A vertical enclosed-type bucket elevator rated at 50 tons per hour and a 9-inch screw feeder serve the plant. Auxiliary and main bins are of the same design and are furnished in either 200 or 400-barrel sizes, with total plant storage capacities of 200, 400, 600, or 800 barrels.

As a result of the design, it is possible to erect a 200-barrel main bin with a long screw feeder and provide for eventual expansion to 400 or 600 barrels by adding the appropriate auxiliary bin.

An initial 400-barrel plan can also be expanded to 600 or 800 barrels.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 121.

A Cold-Mix Process For Asphalt Paving

A cold-mix process for asphalt paving is announced by the Amalga-Pave Asphalt Co., P. O. Box 1048, Fresno, Calif. In this process, all ingredients are handled cold, and no heat is required in any stage of the mixing or laying operation. Three ingredients are used: B.G.S. flux oil, powdered asphalt with a high melting point, and mineral aggregates.

The flux oil is a product of the solvent-extraction process of oil refining; it can displace any moisture from the surface of the aggregate particles, Amalga-Pave explains, and thus eliminates the need for drying or heating. The powdered asphalt used has a melting point in excess of 200 degrees, and when fluxed with the oil, this material provides the binder for the finished pavement. Pure natural rock asphalt, such as Gilsonite, can be substituted. Any mineral aggregate conforming to the grading specifications used in hot-mix practice can be used for the Amalga-Pave process.

To mix the materials, the mineral aggregates and the flux oil are weighed or batched into a pugmill mixer, and the powdered asphalt is added. The mixing cycle runs approximately a minute, and the resultant mixture is described as a freely movable mass of aggregate particles with an oily coating of the B.G.S. flux oil. The powdered asphalt adheres to this coating, the company states.

The hardness of the mixture is controlled by varying the proportion of powdered asphalt to flux oil. It is claimed that the Amalga-Pave mixes will not amalgamate or set up until compacted by rolling and subsequent traffic. This permits stockpiling or long-distance truck or rail transportation.

Special equipment has been designed for this process, or a conversion unit is available for hot-mix equipment. The pugmill mixer is the heart of the plant. The flux oil is introduced in the mixer by means of a conventional spray bar. An impact mill is used to powder the asphalt which is then carried by air into a bin from which it is weighed into the

mixing chamber.

Advantages claimed for the Amalga-Pave plant include extreme portability due to the minimum equipment needed, 2-man operation, high degree of versatility, and a high safety factor due to the simplicity of the equipment.

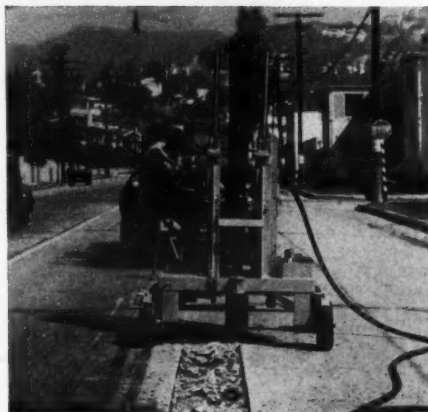
Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 118.

Laboratory for Goodrich

A newly completed research center has been opened at Brecksville, Ohio, by The B. F. Goodrich Co. Brecksville is located about halfway between Akron and Cleveland. The Research Center consists of six buildings containing 81 laboratories and a powerhouse, and was started 3 years ago.

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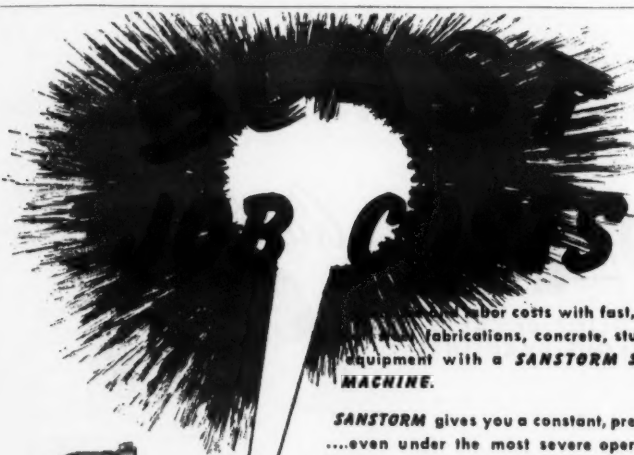
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Ingenious Men Fight Battle of Maintenance

High Traffic, Low Funds Are Serious Problems as Division Crews Tackle Adventure on the Roads

♦ TOPPING the slight rise on Highway 40 at high speed, a 1939 model coupé approached a maintenance gang without slackening speed. Frantically the flagman tried to wave the car to a stop. It was too late.

Men dropped their tools and dived for the ditches as the coupé careened past the flagman and plowed into the rear of the maintenance foreman's pickup truck, parked just in front of the asphalt distributor. With a sickening smash of metal against metal, the coupé bounced off, crashed through the asphalt-underseal nozzle, ripped the hose, and skidded towards the ditch. Spewing scalding-hot 450-degree asphalt, one end of the hose whipped through the air. Fortunately it only slapped against the pump-engine switch and killed the engine.

Men picked themselves up, made certain they were not burned, and surveyed the damage. The car driver, a woman 62 years old, was unhurt but scared. "I just don't know why I did it," she said. "I saw your flagman well enough, but the brakes on my car aren't too good any more."

This little incident, which happened the day CONTRACTORS AND ENGINEERS MONTHLY's Western Editor visited Division 5 maintenance crews of the Missouri State Highway Department, is unusual only in that no man in the 7-man gang was hurt. Traffic—the craziest kind of traffic—is one reason why Division 5 maintenance men fight a head-up battle against the elements which make highways go bad.

The safety record is good, however, largely because of alert men. It has been quite some time now since the last fatality.

Introducing Division 5

Division 5, with headquarters in Jefferson City, Mo., is located in the central part of the state. Its 1,653-mile system of highways is heavily traveled, with traffic of from 2,300 to 3,300 vehicles per day, depending on the time of the week, over its main routes. Under the leadership of Division Engineer V. B. Saville, District 5 ranks among the top divisions of the state from the standpoint of efficiency and magnitude of its work.

Division 5 includes a block of 12 central Missouri counties: Howard, Boone, Callaway, Montgomery, Cooper, Moniteau, Cole, Osage, Morgan, Miller, Maries, and Camden. Through this division pass 385 miles of bituminous highways, 425 miles of portland-cement concrete roads, and about 843 miles of graded, drained, gravel thoroughfares.

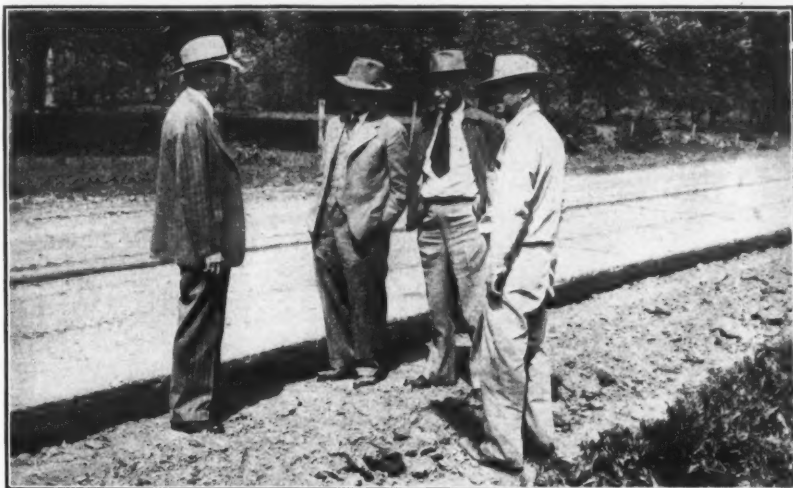
U. S. 40, one of the principal concrete roads through Division 5, was one of the first high-type highways ever built in Missouri. Since its construction back in 1925-1930, however, heavy traffic has broken up much of the old slab and started joint pumping. Now, one of the principal maintenance jobs consists of Mud-Jacking and asphalt undersealing under the old slab, concrete patching, and hot-mix bituminous upper-decking. The latter is usually classed as construction and done by contract.

Too, Missouri is moving rapidly from gravel secondary roads to a much higher type of dustless all-weather construction. Today many of her gravel roads are being surfaced with bituminous armor coat. Maintenance costs for the first few years, until this armor coat can be built up with additional

upper-decking, are high. And while Missouri's Highway Department is pulling itself up to a higher level of construction, its maintenance men fight to hold their own in this bituminous battle.

If funds were plentiful, the battle would not be difficult. But Missouri now has the lowest gasoline tax in the nation. The entire allocation for highway maintenance in Division 5 is only \$750,000 per year—about half the amount, for example, that San Bernardino County, Calif., uses all by itself. Highway maintenance, as well as construction, is merely a nice balance between what the engineers would like to have and what they can afford.

The organization, methods, and equipment used by the Division 5 main-




C. & E. M. Photo

Construction jobs take maintenance into consideration in Division 5, Mo. Witness this conference of Division Engineer V. B. Saville, Maintenance Engineer George Wolf, Division Construction Engineer G. L. Gray, and Resident Engineer Jimmy Glen.


tenance crews are geared to meet efficiently certain cost limits, with rea-

sonably good maintenance results. Each
(Continued on next page)



YOU KNOW IT BY NAME;

You know the name, "QUICK-WAY", by far the oldest in the production of truck mounted power shovels. All over the world truck shovels and truck cranes are quite commonly known as "QUICK-WAYS" regardless of who made them, because "QUICK-WAYS" set the standard.



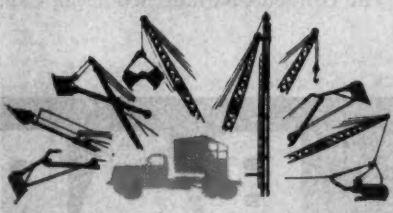
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5. It's easy to service and adjust, with simple interchangeable parts.
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C. & E. M. Photo

Asphalt undersealing shown here with 30 to 40-penetration asphalt in use is an important part of Division 5's maintenance of its concrete roads.

Ingenious Men Fight Battle of Maintenance

(Continued from preceding page)

year these cost limits are set up by Rex M. Whitton, Missouri's capable and well known highway maintenance engineer. (See C. & E. M., Sept., 1947, pg. 49.) The limitation figures which he set this year were as follows:

Type of Highway	Maintenance Cost Limits
High-travel concrete, main roads	\$650 per mile
Medium-travel concrete, main roads	400 per mile
Bituminous macadam, main roads	450 per mile
Secondary roads, bituminous	725 per mile
Gravel	260 per mile
Temporary detours	150 per mile
Supplementary routes, concrete	400 per mile
Supplementary routes, bituminous	500 per mile
Supplementary routes, gravel	170 per mile

In addition to this work, occasional small construction jobs and experimental sections which are done with maintenance men and equipment are paid for independently with construction funds.

Division Organization

Division 5 has a maintenance organization of about 54 full-time men assigned to sections, and from 150 to 200 extra men who are picked up and laid off according to the work. Division Engineer V. B. Saville, under whose direction the job is done, is a 28-year man with the Missouri State Highway Department, and has been a division engineer for 11 years.

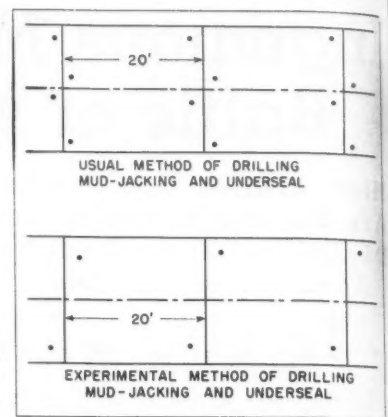
In direct charge of all division maintenance work is George Wolf, a serious, hard-working engineer whose family and social life are forced to fit into whatever time he has left after at least

assignment. Wolf has seen a lot of highway work.

Under Wolf is an Assistant Maintenance Engineer, often called the Division Superintendent. His is a coordinator's job, and consists of carrying out any policies set up or passed down through Mr. Wolf.

The 12 counties are divided then into 5 maintenance districts, each with a district foreman in charge of all routine highway maintenance and emergency work. Each of these foremen has from 9 to 13 full-time men, and extra men as required. They each have about 9 motor graders, an average of 15 small 1½-ton dump trucks, 3 tractors with front-end loaders, a trailer-type asphalt distributor, and 5 power mowers.

In addition to the five district foremen, the Division uses four other foremen, all of whom are specialists in their line and who work throughout the division. Two of these foremen do bituminous work on undersealing and upper-decking. One foreman is a specialist on concrete-pavement repair and



patching. One other, with grading equipment, handles excavations which always seem to crop up.

These specialist foremen have at their disposal certain division equipment, such as 3 large Etnyre truck-mounted pressure distributors, a ½-cubic-yard (Continued on next page)

EASY, INEXPENSIVE SOIL COMPACTION

The New BARCO RAMMER

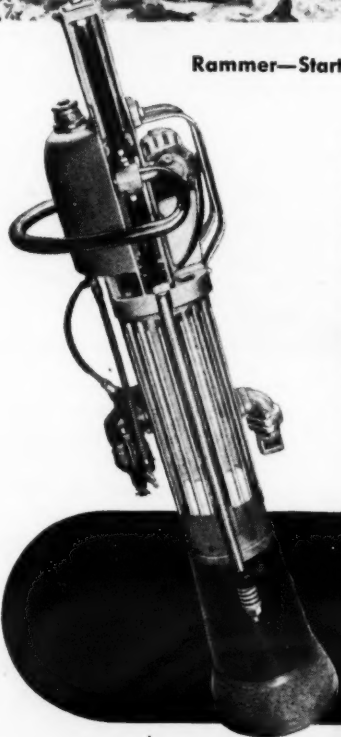


Rammer—Starting



Rammer—Jumping

Once again Barco comes up with an entirely new product that solves a big problem in an entirely new way. Armed with the easy-to-handle Barco Rammer, a man can tamp all the hard-to-reach spots close to walls, abutments, culverts—locations no roller can reach. Barco is faster and more effective, does not tire out the worker. On backfill tamping jobs large enough for a ditcher, the Barco Rammer tamps excavations flat, leaves the ground in original state—a result which more and more local governments insist upon and which good public relations demands. For more information write Barco Manufacturing Company, 1818 Winnemac Avenue, Chicago 40, Illinois. In Canada: The Holden Co., Ltd., Montreal, Canada.

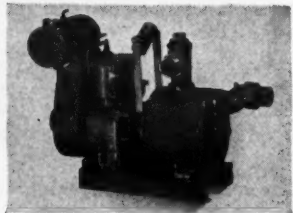


BARCO

GASOLINE RAMMER

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HACKENSACK, NEW JERSEY

53 PARK PLACE NEW YORK, N. Y.



C. & E. M. Photos

Here are two views of concrete patching in Division 5 of the Missouri State Highway Department. Above, paving breakers powered by a Schramm compressor remove the old concrete in chunks which trucks carry away. At right, a 4-inch layer of crushed rock placed in the bottom of the patch is tamped by a Cleveland C7 air tamper which is powered by a 105-cfm portable LeRoi compressor.



power shovel, 2 11-S concrete mixers, and a new Athey loader with hydraulic controls.

Ordinarily this crew can take care of everything that arises. However, on special occasions at the peak of the year, the best full-time maintenance men are picked out and given crews of extra men for special work that has to be done.

Once each year this entire gang gathers in Jefferson City for the special purpose of getting better acquainted. Ideas are exchanged, lunch and refreshments are served, and the meeting is run by one of the men, with Saville and Wolf taking as small a part as possible. Rex Whitton has a theory that no highway maintenance department is better than the men who work in the road crews, regardless of reputation or propaganda, and this meeting is aimed at making good men better.

Frequent meetings, usually once a month, are held by Wolf for the foremen. There the methods of carrying out overall policy are set up.

Through the entire organization runs the coherent theme that each man is a valued employee, and that he is a public servant, responsible to the people of Missouri as well as to the Highway Department. This sometimes takes queer turns, as it did last year on one of the maintenance jobs.

For a week, every night, someone had knocked down all the barricade warning boards on a 10-mile patch job. No matter how carefully they were set up, everything was leveled down by morning. The foreman decided to stay out all night and investigate the cause of the disturbance.

About 10 p. m. a small automobile, weaving erratically, passed through the job. At each barricade the driver cut in just enough so his bumper could knock the barricade over with a crash. Leaping in their car, the maintenance foreman and his assistant gave chase, finally crowding the vandalistic driver over to the side of the road.

"What do you think you're doing?" the maintenance foreman asked, noting the general condition of the bloated purple-faced man in the car.

"I'm knockin' every last sign down on this here job, thass what I'm doin'. An' you ain't stopping me either, see? I'm a taxpayer, I am, and you guys work for me—hey, who do you guys work for, anyway? What's all this to you guys, anyway?" the inebriate demanded.

"We work for the Highway Department and the taxpayers," said the maintenance boss.

"Okay, okay," leered the drunk happily, reaching for his gear-shift lever. "I'll knock some more down an' you guys can pick 'em up. Thash one way you can work for us both!"

Job Has Grown Rapidly

Over the years the maintenance job

has increased rapidly. Division 5 maintenance crews now use as much bituminous material as the State of Missouri did 12 years ago. This year, for exam-

ple, the Division will use about 120 carloads of asphalt and 50,000 cubic yards of gravel for replacement.

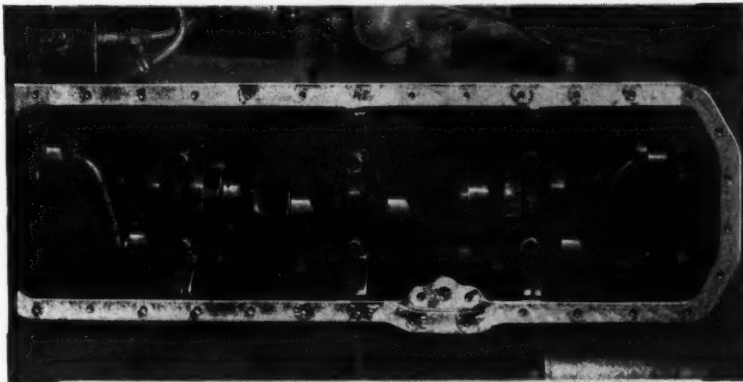
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STANDARD ENGINEER'S REPORT



GASOLINE BUS ENGINE RUNS 90,371 MILES IN CLIMATIC EXTREMES WITHOUT SLUDGE OR CARBON TROUBLE

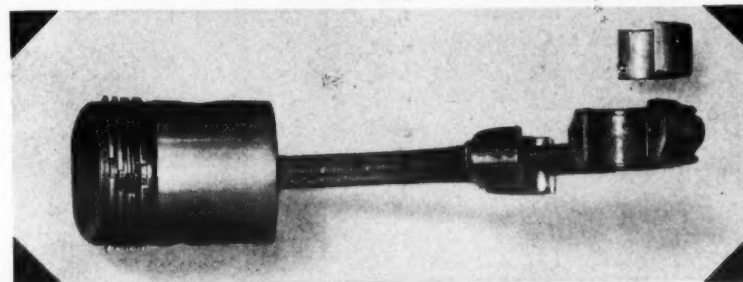
TEST DATA	
UNIT	8 cyl. High Compression Bus Engine
LUBRICANT	RPM Heavy Duty Motor Oil SAE 30
MILES RUN	90,371
CONDITIONS	Highway Operation - Below freezing to desert heat
FIRM	Moyers Stages
LOCATION	Fresno, Calif.



This bus engine was torn down after operating in regular highway service for 90,371 miles on RPM Heavy Duty Motor Oil ... average speed, 50 M.P.H. with many starts and stops. Inland valley weather conditions - below freezing in winter to more than 100° F. above zero in the shade in summer. As the photograph shows, the inside of the engine was exceptionally clean. RPM Heavy Duty Motor Oil's special detergent compounding keeps all engine parts cleaner.



The oil-pump screen was clear and no deposits had accumulated in the crankcase pan. With RPM Heavy Duty Motor Oil, any lacquer, carbon, sludge or other foreign matter is dispersed in the oil and flows out when the crankcase is drained.



All rings were free and bearings in good condition as indicated by this piston and connecting rod from the engine. RPM Heavy Duty Motor Oil loosens and removes lacquer and carbon from around rings -- keeps oil return holes open and deposits from building up in grooves. It is not corrosive to any bearing metal.

REMARKS: RPM Heavy Duty Motor Oil SAE 30 was in this engine from the time the engine was new and first put in service. The crankcase was drained at regular intervals. Special compounds in RPM Heavy Duty Motor Oil give it the ability to keep engines clean, adhere to both hot and cold spots in engines, resist oxidation, prevent corrosion and foaming.

STANDARD TECHNICAL SERVICE conducted and reported this test: If you have a lubrication or fuel problem, your Standard Fuel and Lubricant Engineer or Representative will give you expert help; or write Standard of California, 225 Bush Street, San Francisco 20.

ROAD SIGNS AUTOMATIC TYPE

3 ft. or 4 ft. furnished complete with sign and 2 red flags. Beside the sign illustrated therewith we supply wording as follows: "Danger," "Danger Men Working," "Men Working Above." Also have other types.



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C. & E. M. Photos
Missouri Division 5 maintenance crews put in a concrete patch designed to the same formula as the original slab (photo at left). Above we see a typical concrete-production set-up for patch work—aggregate piles, a Ransome 11-S mixer, and bag cement. The mixed concrete is hauled to the job by dump truck.

Ingenious Men Fight Battle of Maintenance

(Continued from preceding page)

Major Maintenance Methods

Major road maintenance in the division consists of heavy repair to many of the old 18-foot concrete highways which now are breaking up rapidly. By repairing these roads, and upper-decking the slabs with asphaltic-concrete placed under contract, the Division hopes to add from 10 to 15 years to the life of these roads—perhaps ultimately reconverting some of them to one lane of a divided highway between St. Louis and Kansas City.

The first signs of trouble appear when the longitudinal and transverse cracks start to spall off at the edges. Then free water starts to ooze up through the pavement crack. Still later on, the water turns muddy, and soft mud begins to appear. By and by the slab breaks down at the joint, and a bad failure starts to spread. When one of the heavy trucks which use the slab passes by, water squirts up sometimes 9 or 10 inches in rainy weather.

To fill in the voids under a slab of this kind, a slurry of 4 sacks of portland cement to the cubic yard of topsoil is forced under the slab by a Koehring Mud-Jack, through four drilled holes at each joint. Ordinarily two of these holes are close to the longitudinal center crack, and the others are near each edge, as shown in the accompanying diagram on page 37.

Another slurry of 4 sacks of cement to 22 sacks of fly ash has proved to be good, especially under the edges of bituminous highways in the low spots. Special driving tools to punch a hole through bituminous pavement have been introduced by the Koehring Co., and have been used on bituminous roads. The holes through concrete pavement, of course, have to be drilled with a pneumatic drill and a portable air compressor.

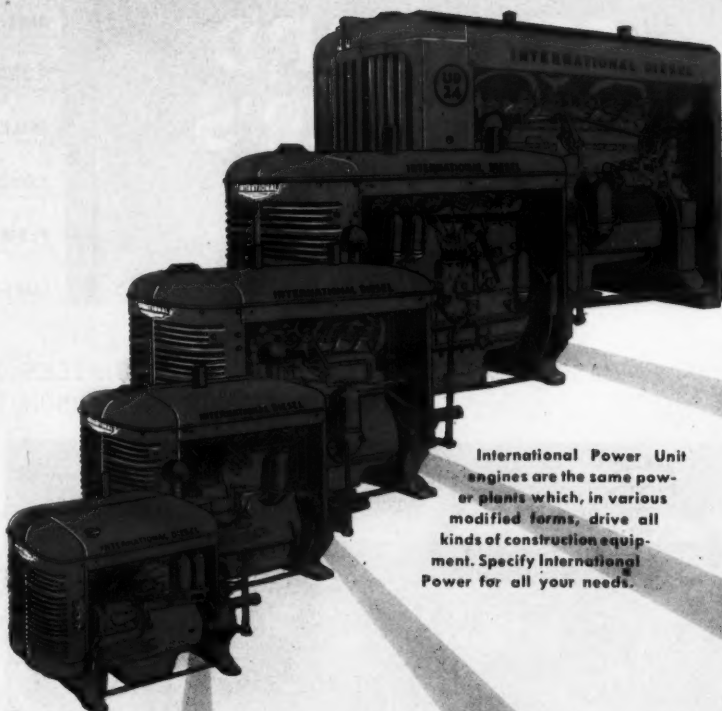
After the Mud-Jacking is finished, asphalt undersealing with 30 to 40-penetration bitumen commences. A typical day on this work accounts for ½ to 1 mile of finished undersealing. Asphalt from refineries in northern Arkansas comes in to the nearest railroad siding, where a Grace tank-car heater breaks the 190-degree asphalt down to a point where asphalt pumps will handle the material. At a temperature of about 300 degrees the asphalt will pump, and a distributor then picks it up and carries it out to the highway job.

The asphalt-undersealing crew has learned a few tricks. Previous to a year ago, the holes had been surrounded with dirt to prevent excess asphalt from sticking. One rainy day the crew noticed that the asphalt refused to stick to the wet pavement. From that time on, a water tank was used, and the holes were splashed just ahead of the undersealing work. This little trick speeded up the operations.

A special device for injecting the hot

(Continued on next page)

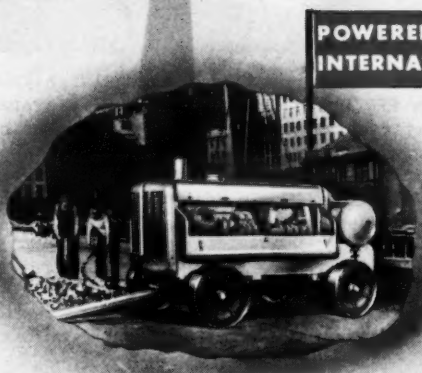
PROGRAM FOR —STANDARDIZE ON IN



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Whatever your construction equipment needs may be—your best equipment buys are the makes with International Power! In tractors, motor graders, high-speed self-propelled scrapers, shovels, air compressors—in whatever you need for a complete "spread"—you can get the same dependable, low-cost International Power.

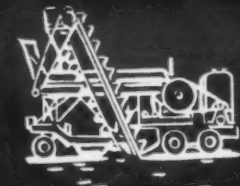
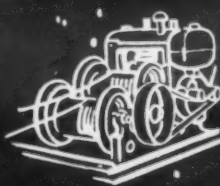
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asphalt through the slab consists of an injection nozzle, valve body, intake and return asphalt lines to the distributor, and a round 12-inch apron which fits over the hole and prevents the hot asphalt from squirting out to burn the men.

When the device is inserted through the drilled hole in the slab, a helper opens the asphalt valve, and the hot material under 40 pounds of pressure flows under the slab. The men know they have the pavement tight when the injector device starts to rise, when the hose tighten up and start to rise, or when the hot asphalt begins to blow out the side of the slab. Sometimes it comes up through one of the other holes. When the slab is all tight underneath, the valve is closed and the ma-

chines are moved ahead to the next hole.

A man then strips away the excess asphalt which bleeds up through the hole. It comes up easily, for the slab was previously wet. He then drives a 4-inch pointed wood plug in the hole. These stakes are made up by the crew in spare time, while waiting for asphalt, or on rainy days. Regular 2 x 4 lumber is ripped, sawed in 8-inch lengths, both ends are sharpened, and the stick is cut in two pieces at the mid-point.

Some promising results on under-sealing work have been obtained in another part of the state by drilling only two holes per joint, each hole at the quarter point on opposite sides of the joint. Reports have indicated that better speed and good results can be

obtained by this method, so Division 5 is currently trying it out.

About 26½ miles of this type of treatment has just been given to U. S. 40 ahead of a contract job for bituminous upper-decking. The work went on from November 1 to May 1, and in that time some 200,000 gallons of asphalt were handled. Final field costs on the 1947 portion were 26 cents per gallon, installed.

It has been found in the past few years that this type of treatment will seal off water and stabilize the subgrades under the old slabs quite effectively; so much so, in fact, that they do not break up. Previously, when the pavements were simply patched, the slab broke up badly on both sides of the patch.



C. & E. M. Photo

Motorists won't knock over this barricade protecting Division 5 maintenance work. They will shy away from the round base and the big chunk of concrete. Note flagman on duty.

When undersealing is done, the patch limits are painted on the slab and a concrete gang moves in. A small portable compressor with enough power to run two 85-pound pneumatic drills is brought in, mounted on a truck. Two jackhammer men then break the concrete out, within the patch limits. As much as possible they try to break it out in rectangular chunks about 75 pounds to the piece. This handles well, can be thrown up on a truck and hauled to the stockpile easily, and can be used handily later on for building ditch checks, riprap masonry, and erosion prevention along some of the washing slopes.

Usually the subgrade under the slab is wet and muddy, so the crew digs down to good ground, cutting past the asphalt underseal at the patch lines. A layer of well graded granular crushed stone is then tamped in, to bring the grade back up to the old slab line. A concrete gang with a small 11-S mixer then turns out good concrete, batched with wheelbarrows across scales to the same formula as the original slab. The sand and aggregates for this concrete are usually produced under contract and stockpiled at short-haul points as directed by the maintenance department.

Each patch is dated, and test beams are made each day. Traffic is not allowed to use the patches until tests show a minimum of 550 pounds of flexural strength. This usually requires three days with the usual 6-sack-per-cubic-yard high-early strength cement mix. A 7-sack regular portland-cement mix is also used.

After a patch job of this kind, traffic can use the road. When the patching reaches a point where it costs about \$750 per mile, reconstruction with hot-mix upper-decking, by contract, is the best solution.

Bituminous Maintenance

Bituminous roads are somewhat on the increase in Missouri, and in Division 5 they come in for a fair share of maintenance work. One of the worst problems, of course, is potholes. The maintenance men are trained to spot a hole as soon as it develops, and to fill it in with road-mixed patch material. MC-3 cut-back asphalt is used on patching, SC-4 on bituminous upper-decking in summer, and RC-3 for sealing or crack pouring.

Extensive upper-decking has recently been done on bituminous roads by maintenance forces, ever since a new Wood self-propelled Roadmixer has been assigned to the Division. Aggregate is laid down in a windrow containing 10 cubic yards per 100 feet. This amount will lay down a mat 1¼ inches thick. The Wood Roadmixer puts hot asphalt in this material in one pass; motor graders then aerate it for a few days and lay it down. Pneumatic and flat-wheel rollers compact it.

The Wood machine will mix 2 miles per 8-hour day, and it saves a great

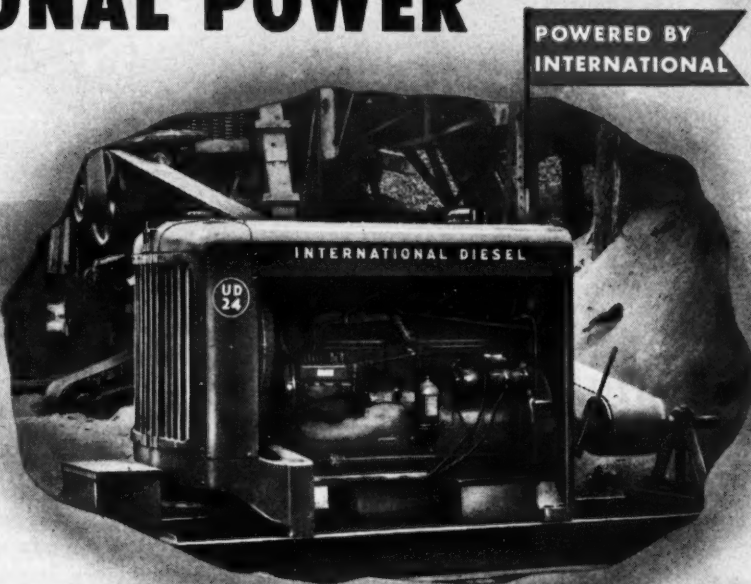
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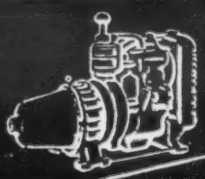
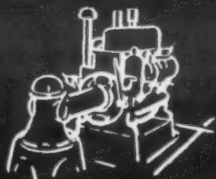
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Industrial Power



Ingenious Men Fight Battle of Maintenance

(Continued from preceding page)

deal of motor-grader blading.

Strategic stockpiles of aggregate for bituminous work are now being scattered over the division to augment some 32 maintenance yards. Other small yards and sheds will be built around some of these good stockpile locations.

Other Maintenance Work

The maintenance of gravel roads has evolved from the old days when every gravel road had a windrow of loose material. The theory these days is that if sufficient fines can be brought up to tie down the loose coarse rock particles, the road will be smooth and durable. Under the action of traffic there is a steady loss of fines, which blow away as dust or wash away in rains. During wet weather, motor graders reach out in the ditches and pull some of these fines back. Mixed together with the loose rock, the material is blended and re-laid.

In ditch work, an excellent use has also been found for the Athey loader. Motor graders tear out many large stones in cleaning ditches. In past years, labor man-hours to separate these big stones ran costs sky-high. Today a motor grader merely flattens the windrow, sweeps most of the big rocks aside, and the Athey loader picks them up and puts them in waiting dump trucks. The finer material can then be spread.

Grading of gravel roads takes place always after a rain. In general, no grading is done during dry weather, so long as the highways are smooth.

Power mowers cut the grass down to the backslope break line by Decoration Day. A second mowing, timed just ahead of July 4, reaches out to the right-of-way limits. The other full-width mowing is scheduled for Labor Day, so the highways will be dressed up their best at those times. The Labor Day mowing also prepares the right-of-way for snow-removal work later on.

Heavy snow removal is never necessary in Division 5, but frequent flurries cause truck-mounted push plows and a big V-plow to make their appearance. Missouri has a Snogo rotary plow at St. Joseph, but this big high-capacity machine is not needed around Jefferson City.

Training of Apprentices:

The Need, Purpose, Method

The average age of skilled workers in the construction industry today is around 43 years. The key to greater productivity therefore lies in replenishing the ranks of these workers, in training apprentices according to established standards. An interesting booklet on the subject, "Apprentice Training—Key to Productivity in Construction", has been issued by the Chamber of Commerce of the United States. It was prepared by the Subcommittee on Apprenticeship and Training of the Construction and Civic Development Department.

The booklet discusses all aspects of

the apprentice programs now under way in the construction industry—primarily among the building trades. It describes how they are organized and carried out. It defines an "apprentice" and an "apprenticeable trade", sets forth the purposes of the apprentice program, etc.

Appendices cover: the relationship between the Bureau of Apprenticeship,

U. S. Department of Labor, and the U. S. Office of Education Federal Security Agency; national apprenticeship standards in the construction industry registered with the Federal Committee on Apprenticeship; state apprenticeship agencies; chamber of commerce apprenticeship activities; and field and regional offices of the Bureau of Ap-

prenticeship, U. S. Department of Labor.

This report was prepared primarily for use by chambers of commerce, and it mentions numerous ways in which they can encourage apprentice-training programs. Copies may be obtained by writing to the U. S. Chamber of Commerce, Washington 6, D. C.

Eaton Planetary Construction
Makes Shifting Easy at all Speeds

The design and construction of Eaton 2-Speed Truck Axles permit the planetary parts to turn at slow speed. This allows smooth, easy, clash-free shifting from one range to another at all truck speeds. The result—proper shifting for most efficient and economical operation, minimum driver fatigue, and longer life for the entire truck. Outstanding performance records are proof of Eaton quality and design. See your truck dealer for complete information.

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save time between jobs with JAHN TILT TRAILERS

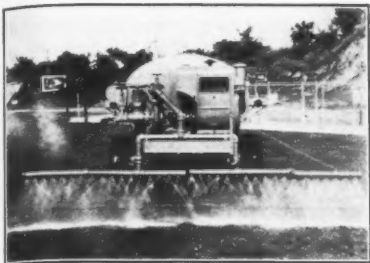
Tilt-load—and you're off in a matter of minutes with a Jahn Tilt Trailer. No jacks or loading ramps required. One-man operation. Positive, automatic safety lock holds platform in position when loaded or empty. Rubber mounted drawbar absorbs road shocks and protects both truck and trailer. Ideal for transporting tractors—rollers—compressors—shovel-loaders—mixers, etc. Jahn Tilt Trailers are available in 8 ton capacity tandem axle and 5 ton capacity single axle models. Write for specifications and illustrated bulletin or see your nearest Jahn distributor.

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The Gunnison water sprinkler is power-operated and its application can be controlled from a light mist to street-flushing capacity.

Water-Spraying Unit Is Power-Controlled

A new power-operated water sprinkler made by the Gunnison Mfg. Co., 201 Lynn Ave., Baraboo, Wis., was displayed at the Road Show. It was demonstrated during the construction of a soil-cement plane-parking area that took place during the Show. Its application can be controlled from a light mist to street-flushing capacity. It is manufactured in both a truck-mounting or trailer type.

Power to drive the pump is furnished by a 4-cylinder air-cooled Wisconsin engine. Water is pumped through spray bars at the rear of the tank under a variable pressure of from 10 to 70 psi. The variation is obtained by throttle control of the engine speeds. Engine controls are set at the factory to give applications in tenths of a gallon per square foot. All controls are placed within easy reach of the truck driver.

The spray bar consists of two 4-foot sections, to which 6 feet can be added in 1-foot lengths, making a total of 20 feet available. Nozzle spacing is set at 3 inches. Two outlets other than spray bars are furnished. One is a 3-inch outlet for direct connection to soil-stabilizing equipment. The other is a 1½-inch fire-hose outlet.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 122.

New Drafting Tool

Several improved models of drafting instruments are announced by the Charles Bruning Co., Inc., 4754 Montrose Ave., Chicago 41, Ill. A feature of these floating T-squares is the Equipoise mechanism said to insure accurate alignment on drawing boards inclined to angles as much as 20 degrees from the horizontal.

Other features claimed by the manufacturer include a revised protractor-head assembly, a relocated and re-designed base-line-setting device for locking the protractor index point to any angle, and an increased distance between the clamp screws for holding the unit securely and rigidly to the drawing board. Bruning makes this unit in three sizes, and all have the Equipoise feature. The unit can be used as a T-square, straight edge, triangle, protractor, and scale.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 85.

New Name for Consolidated

Consolidated Steel Corp. is now conducting business under the new corporate name of Consolidated Western Steel Corp. Its wholly owned subsidiaries, Western Pipe & Steel Co. of California, and The Steel Tank & Pipe Co., will be operated as units of Consolidated Western. Consolidated Steel Corp. of Texas will continue to operate as a separate corporation, under its own name, in Texas and other states.

Consolidated provides a complete service of engineering, fabrication, and installation of steel products. Principal offices are located in Los Angeles and San Francisco, with operating plants in both areas and at Berkeley, Fresno,

Bakersfield, and Taft, Calif., and in Phoenix, Ariz.

Scaffold Brackets

Brackets designed to speed the erection of pole scaffolds are made by the Du-All Scaffold Bracket Co., 44 E. Broad St., Columbus, Ohio. According to the manufacturer, pole scaffolds can be built to any height with these brackets without the need for nails or bolts, or special tools. They are designed for use with any 4 x 4's used as uprights or planks.

In operation, the bracket is placed around the two members to be joined, and it is then tightened down on them by means of an L-shaped bolt. This bolt has a malleable cast-iron non-slipping pressure lug equipped with pointed teeth to help anchor the bracket to the wooden members. The brackets are self-locking.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 66.

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ASPHALT
TANKS
OIL TANKS
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CHATTANOOGA, TENNESSEE, U.S.A.

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3¼-S Tilting Mixer. Capacity, 3½ cu. ft. plus 10% overload (A.G.C. rating).

Quickly spotted and towed, this half-bag mixer is a cost-cutting combination of strength, lightness and efficiency. Other Ransome Blue Brute Mixers in capacities up to 126 cu. ft.

AIR AT SHORT NOTICE...

A light-weight, handy compressor that can get around fast! Powers light hand-held Rock Drill, Paving Breaker or equivalent air tools through its easy-breathing Feather* Valves — with unfailing dependability and economy.

*Reg. U. S. Pat. Off.



60' Contractor's Portable Compressor. Other Blue Brute Compressors up to 500' capacity.

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Blue Brute Self-Priming Centrifugal Pump. Built in A.G.C. sizes to A.G.C. standards.

Now! a Contractor's Pump by Worthington, the world's largest pump makers, with fast, dependable pickup that saves time and money. Rust- and abrasion-resistant, with built-in self-priming.

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Though tough and powerful, Blue Brute Air Tools are light and compact, with the easy handling that means more satisfied workers... more work done... more profit for you.



Paving Breaker, WB-50

Rock Drill, WJ-45

Clay Digger, W-19

Backfill Tamper, W-8

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H8-2



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The Grannan lubricator valve is designed to deliver a metered amount of oil or grease to each bearing in a lubricating system, and can be used with all lubricants.

Oil-Metering Valve

A new lubricator valve for use with bearings is announced by Titeflex, Inc., 740 Frelinghuysen Ave., Newark 5, N. J. The Grannan Lubricator is said to deliver a metered amount of oil or

grease to each bearing in the lubricating system. According to the manufacturer, it can be used with all lubricants—from light oil to heavy grease—through the same valve without alteration; its applications include trucks, construction equipment, machine tools, and similar units.

Described as a fully hydraulic through-flow valve, it has no pockets or crevices which might retard lubrication. The valve is enclosed to prevent leakage and to eliminate possibility of contamination to the lubricant from outside sources. Installed directly into the bearing, it can be used with standard lubricating guns, either hand-operated or completely automatic systems set to operate at any desired interval. Operating temperature range is said to be from 0 to 300 degrees F. The manufacturer also explains that the Grannan Lubricator can be used to lubricate up to 500 bearings or more in less than one minute while the machine is in operation.

Further information may be secured

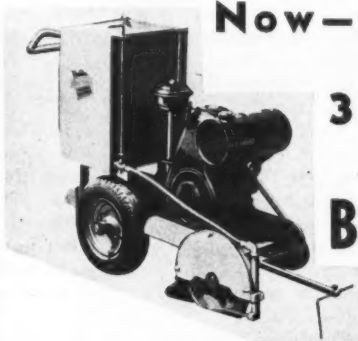
from the company, or by using the enclosed Request Card. Circle No. 33.

LeTourneau Promotions

Danforth K. Heiple is now Chief Field Engineer for R. G. LeTourneau, Inc. He succeeds R. C. Lewis, who has

resigned. In his new duties, Mr. Heiple will give sales assistance to LeTourneau distributors in planning equipment applications and compilation of earth-moving production and cost.

Harry R. Powers has been appointed Eastern Sales Manager to succeed E. M. Ferguson, who has resigned.



**Now—one man can
cut concrete
3 to 5 times faster**

with the

**Backlin Stratedge
CONCRETE CUTTER**

The Backlin STRATEDGE concrete cutter cuts fast . . . up to 60" per minute . . . straight and clean, leaving sharp, straight edges and 90° corners. Depth of cut can be regulated from 1" to 3". A 6-hp. engine drives the specially designed diamond saw.

The STRATEDGE cutter will cut or score concrete, asphalt, marble, tile or terrazzo. Used on large or small jobs by contractors, highway crews and municipalities.

A self-contained unit, STRATEDGE requires only one man for operation. Easy handling, powerful performance with minimum vibration, makes it efficient for large scoring or cutting jobs. Lightweight, simple transportation, makes STRATEDGE economical for small, scattered jobs.

WRITE FOR FOLDER GIVING FULL DETAILS

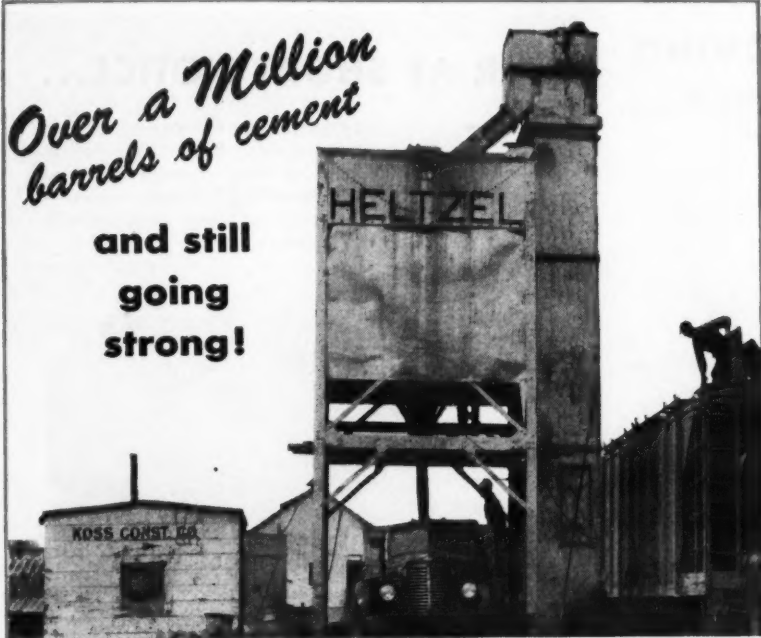
Backlin

PRODUCTS CO.

Burlington, Wisconsin

*Over a Million
barrels of cement*

**and still
going
strong!**



**VETERAN HELTZEL PLANT HAS REPAID
ITS COST 42 TIMES OVER IN 17 YEARS . . .**

• 1,160,500 barrels of cement have been unloaded by this plant. In 1931, time studies indicated the plant cost would be repaid at the handling of 25,000 to 30,000 barrels. (Note comments by Mr. Koss in the following letter.)

Koss Construction Co. Since 1914
April 21, 1948
1400 BUREAU BUILDING
DES MOINES 9, IOWA

Mr. Donald T. Heltzel
Heltzel Steel Form and Iron Co.
Warren, Ohio

Dear Sir:

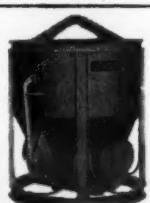
Our records indicate this bin was purchased by us in 1931. It has been used by us on paving projects all over the middle-west from that time until the present and is still a good plant and doing a fine job. During this period, we have unloaded 1,160,500 barrels of cement with the Heltzel, including box cars, hopper bottoms and truck delivery. You can be justifiably proud of the performance of this equipment.

Yours very truly,

Richard D. Koss
Vice President

RBK:im

Heltzel plants are products of specialized engineering, and constructed for lasting, trouble-free service. Your requirements for plants will be served best by Heltzel. Write for information and literature.



CONCRETE BUCKETS

HELTZEL STEEL FORM & IRON CO.
WARREN, OHIO • U. S. A.

**Those Small Jobs Go Easier
and Faster with**

SYNTRON

**CONSTRUCTION and
MAINTENANCE TOOLS**

Busting concrete, digging clay, shale and frozen ground; cutting asphalt and tamping backfill—with Gasoline Hammer Paving Breakers.

Drilling, cutting, chipping concrete and masonry; vibrating concrete forms and molds; scaling concrete, rust and old paint from equipment—with Electric Hammers.

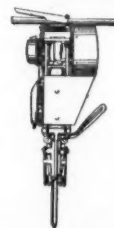
Drilling, sanding, buffing and polishing wood and metal with Electric Drills and Sanders. Grinding welds and wire brush work with Electric Grinders.

Vibrating thin wall forms; burial vault forms, pipe forms and other precast concrete products with electromagnetic Form Vibrators. Vibrating bridge decks, floor slabs, piers, etc., with flexible shaft Mass Vibrators.

Write for literature on this TIME AND COST SAVING equipment.

SYNTRON CO.

227 Lexington, Homer City, Pa.



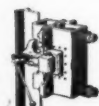
"Gasoline Hammer"
PAVING BREAKERS
100% Self Contained



"Portable"
ELECTRIC HAMMERS



"Portable"
ELECTRIC DRILLS



CONCRETE VIBRATORS



Portable Electric
GRINDERS—SANDERS

Sand-Asphalt Runway For Class 3 Airport

New Field at Panama City, In Florida, Built on Flat Sandy Soil; Long Ditches And Pipe Carry Drainage

A NEW Class 3 airport has been added this year to the list of airfields in this country. Bay County Airport, 4 miles northeast of Panama City, Fla., has just been completed with a sand-asphalt paved runway 4,000 feet long x 150 feet wide. The Airport Authority of Panama City awarded a contract for the construction to the Smith Engineering & Construction Co. of Pensacola, Fla. The contract included clearing; grading; drainage; paving a single runway, one taxiway, and apron; grassing; lighting; fencing; and administration building. Sponsored by Panama City, the new construction was part of the 1947-1948 Federal-Aid Program as a project of the Civil Aeronautics Administration. The total cost was \$243,144.

Class 3 airports must have a runway from 3,700 to 4,700 feet long. The runway at the Bay County Airport, presently named after the county in which it is located, is graded to a length of 4,700 x 500 feet wide and is northeast-southwest in direction. The 630-acre site for the field is ample for the construction of future runways when the need arises. From the two extremities of the runway, 50-foot sand-asphalt taxiways will run back to a concrete-paved apron, 200 x 175 feet. The north-south taxiway included in this contract is 1,300 feet long. The runway and taxiways form a triangular pattern, with the apron and administration building at a corner of the triangle. The building is a masonry construction plastered and stuccoed, and contains a ticket office, lounge, and rest rooms.

Construction on the airport got under way on January 12 and was completed in July. Smith & Gillespie, Consulting Engineers, of Jacksonville, Fla., made preliminary surveys and designed and supervised the construction. The National Airlines is expected to begin passenger service soon at the field, with a mail contract at the start. The closest other airport in the vicinity is Tyndall Field, a U. S. Army Air Base, 8 miles east of Panama City.

Panama City, county seat of Bay County, has a population of 35,000. It is located on St. Andrews Bay, an indentation off the Gulf of Mexico, the largest land-locked harbor between Tampa and New Orleans. It also has a channel connection to the Gulf Intracoastal Waterway. One of the leading ports of Florida, Panama City has a harbor with 30 to 60 feet of water. It is an important terminal and transshipping point, with large oil terminals and shipyards. The new airport is expected to serve a need in the community.

Flat, Sandy Site

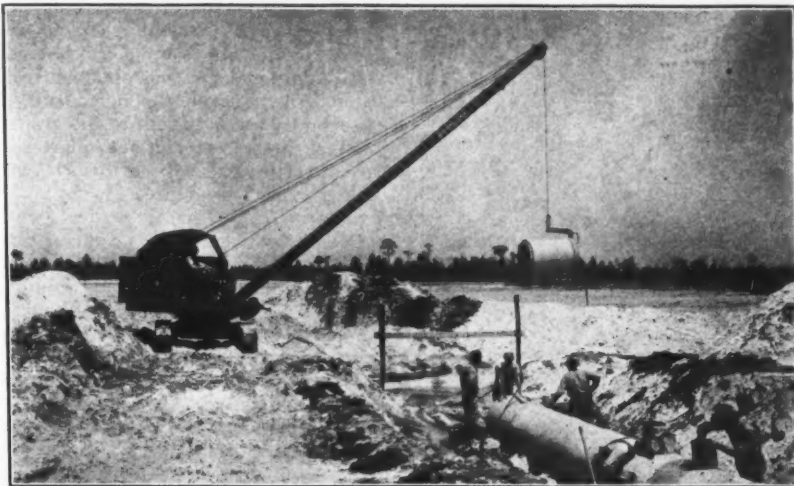
The entire area of the airport site is typical of the West Florida Gulf Coast section. The surface features consist of dry areas covered with pine and palmetto, and low wet areas covered with titi and scattered cypress. Titi is a bush with tough, sturdy roots of high nuisance value in clearing operations. Muck in varying depth was usually found in the low areas. The sand which predominated over the flat site ranged in color from white through gray, yellow, and brown, but had uniform gradation.

The general topography and the level of the water table at an average elevation of 10.25 indicated the presence of an underlying hardpan, also typical of the locality. Generally the upper 2 feet of the field consisted of topsoil and

sand, beneath which was a layer of hardpan averaging 6 inches thick. Below that, white and occasional strata of grey sand were met until another layer of hardpan was encountered about 6 feet below the surface. This hardpan averaged 6 inches in thickness. Below that the sand continued downward.

Subsurface conditions at the field were confirmed in digging the drainage ditches which are so important in this flat country only a few feet above sea level. After these ditches were excavated and functioning, the water table at 10.25 elevation was lowered 4 feet

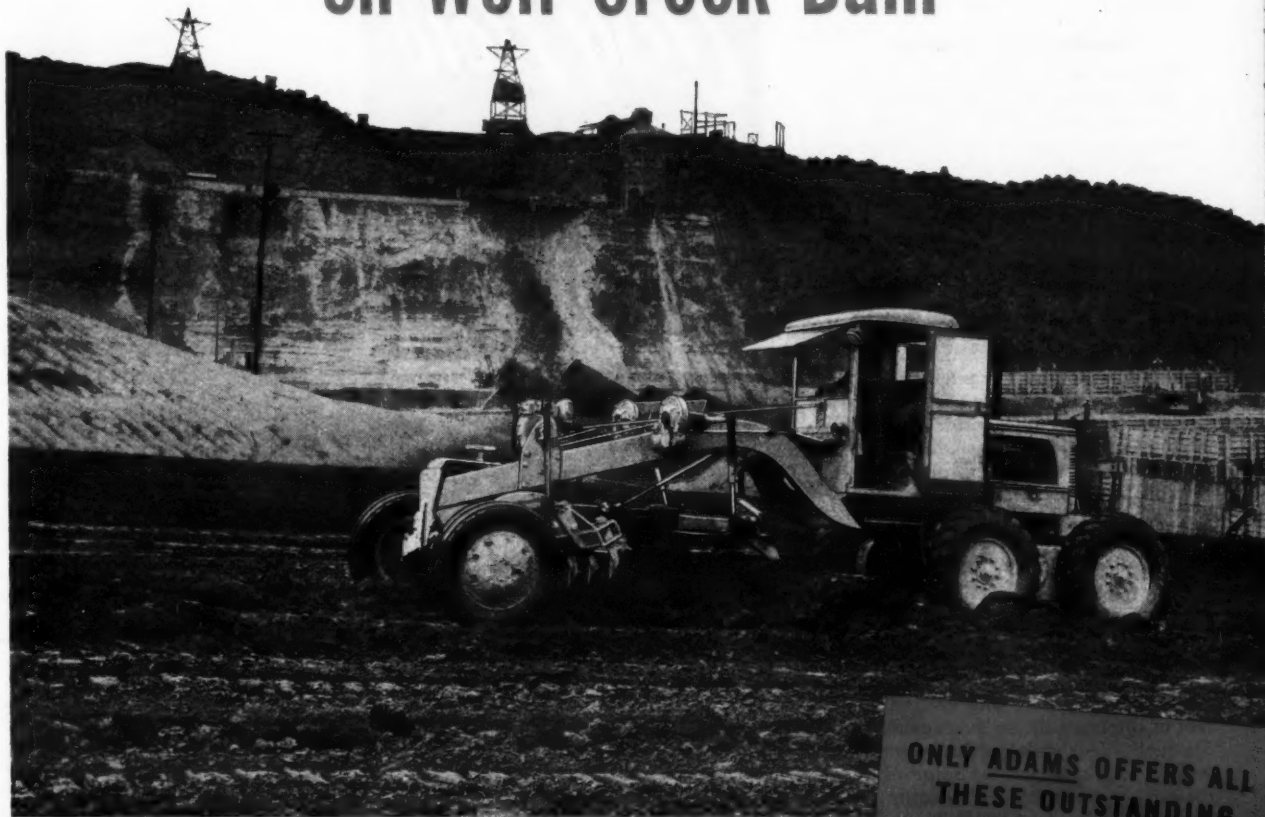
(Continued on next page)



C. & E. M. Photo

A Bucyrus-Erie 10-B crane, with a 50-foot boom and a pipe hook, sets a 4-foot length of 30-inch concrete pipe in a 300-foot drainage line at Bay County Airport.

Adams advantages pay off on Wolf Creek Dam—



The Wolf Creek Dam Project in Kentucky, when completed, will be the largest multi-purpose dam in America—controlling flood waters, supplying hydro-electric power.

Great fleets of heavy earth-moving equipment give the haul roads into the site a terrific beating, 16 hours a day. To keep the roads in fast travel condition is a tough, round-the-clock job. Several Adams Motor Graders help do it—efficiently, economically—in all weather, good and bad.

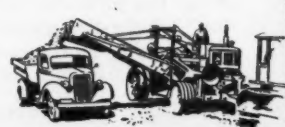
Adams Motor Graders are also being used at Wolf Creek to spread hauled-in material at the dam site. Working mostly in loose, hard-to-manage material, they are delivering the power, the traction, the speed and ease of control needed to handle all grading in fastest time, at lowest cost. They're proving that, now as always, Adams Motor Graders are *Your Best Buy—All Ways*. See your local Adams dealer.

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Adams



MOTOR GRADERS • LEANING WHEEL GRADERS • ELEVATING GRADERS



C. & E. M. Photo
Superintendent Frank D. Rials, left, and Herbert Misell, Sr., representing the Panama City Airport Authority, find a spot of shade on the Bay County Airport job and pose for the **CONTRACTORS AND ENGINEERS MONTHLY** cameraman.

Sand-Asphalt Runway For Class 3 Airport

(Continued from preceding page)

over the whole airport. In relation to this, the paved areas of the runway and taxiway range between 12.5 and 13.5 elevation.

Clearing and Drainage

The first work at the field consisted of clearing 88 acres which were covered with scrub pine, scrub oak, some cypress up to 12 inches in diameter, and a thick bush growth—chiefly the strongly entrenched titi. Only the area involved in the present construction was cleared. The big gun in the clearing operations was a Fleco brush dozer which was attached to the front end of a Caterpillar D8 tractor like any dozer blade. This piece of equipment is widely used in Florida land-clearing work. It is 10 feet wide and has ten teeth, 4 feet long, which easily dug out the thick brush as well as the small trees. Making 10-foot-wide swaths through the heavy growth, the dozer piled up the trees and brush for burning.

With the site cleared, work started on the grading and drainage. The general plan of drainage draws the water from the center of the field off to the edges, where ditches drain into Big and Little Goose Bayous on the north, and Robinson Bayou on the south. The bayous eventually empty into St. Andrews Bay. The contractor dug around 12,000 feet of ditches with an average depth of 5½ feet, 4 feet wide on the bottom, and with 3 to 1 side slopes. Some of these ditches had continuous lengths of as much as 2,500 and 3,000 feet.

Ditch excavation was handled first by four Super C Tournapulls with LP 12-yard scrapers. But when the digging became too boggy a Bucyrus-Erie Model 10-B dragline with a 50-foot boom and ¾-yard bucket took over the work and completed the excavation. Ditch excavation on the job totaled 30,000 cubic yards. The interior of the field is drained into three catch basins which lead into three pipe structures, two of which cross taxiways and the third a runway. They have outlets, in turn, in the ditches.

Concrete pipe for the structures was supplied by the Universal Pipe Co. of Dothan, Ala. Around 1,000 linear feet of 24 and 30-inch pipe was required. The 4-foot pipe sections were handled by the Bucyrus-Erie 10-B crane equipped with a U-shaped pipe hook. After the pipe was set in the trench, the tongue-and-groove joints were wiped with mortar to a width of 6 inches and 1½-inch depth of bead.

Grading

As the ditching progressed, grading began over the field. The general movement of material was to the center to fill in the low area there. Material

excavated from the ditches around the periphery was brought back to the middle of the site to build up the runway. Additional dirt was obtained from two borrow pits on the north side of the runway and adjacent to the graded areas of the field. About one-quarter of the 110,000 yards of earthwork was obtained from this source.

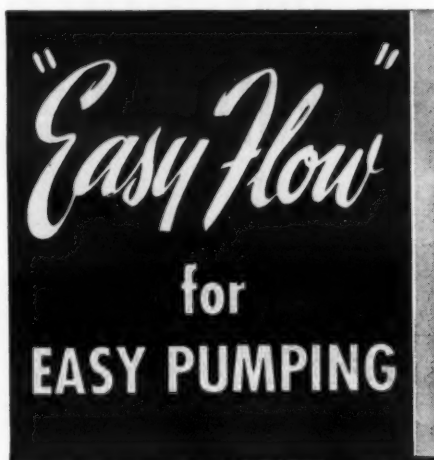
Long hauls, averaging 800 feet, were handled by the four Tournapulls. Shorter hauls averaging 400 feet saw two D8 tractors in service pulling LeTourneau 12-yard LP scrapers. Further distribution of the few final inches at the top was done by a LeTourneau LS 8-yard finishing pan pulled by a Caterpillar D7 tractor. The Tournapulls were helped in loading by a D8 pushing from the rear, while an M7 tractor pulled in front with an 18-foot length of 1-inch steel cable. The tractor-scraper units had another M7 tractor for assistance in push loading. With this equipment an average of 2,600 cubic yards was moved in an 8-hour

(Continued on next page)



Everybody has commented on the really beautiful four color illustrations contained in the VICTOR Bulletin Form 20 . . . it covers fine welding and cutting equipment . . . it will be yours, free, for the asking. Write us today for your copy.

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DEPENDABILITY PLUS

A Rex "Easy Flow" Pump is dependability itself . . . not for just one season but for many a year of tough service. Note the rugged press-formed pump body with its glass-smooth steel interior surface. This frictionless surface permits the smoothest flow of water through the pump . . . increases pump efficiency. There are no rough, pitted surfaces to encourage corrosion and early wear. No priming delays with this design. And note the straight line suction intake. Water takes a slightly downhill flow right to the eye of the impeller with least possible friction loss.

SUSTAINED EFFICIENCY

Rex "Easy Flow" has a replaceable liner plate and a lifetime seal. But, here's the real secret behind the ability of the Rex "Easy Flow" to give you new pump efficiency for the lifetime of the pump. The exclusive adjustable air peeler is easily adjusted to restore original clearance with the impeller to compensate for wear . . . assuring the ability in an old pump to give you original priming efficiency at maximum suction lifts.

LIGHT WEIGHT

With its press-formed body and volute, the Rex "Easy Flow" is approximately 30% lighter than cast styles. It's easy to handle . . . easy to spot. Yet this pump is the most durable in the field . . . proved in actual applications. Engine is located over the wheels so you lift only the weight of the pump when wheeling from spot to spot.

For all the facts, see your Rex Distributor or write for your copy of Bulletin No. 47-12. Chain Belt Company. 1666 West Bruce Street, Milwaukee 4, Wis.





C. & E. M. Photos

The Fleco brush dozer at left, attached to the front of a Caterpillar D8 tractor, was the big gun in clearing operations at Bay County Airport. Above, a Super C Tournapull with a 12-yard LP Carryall gets loaded with muck during airport grading operations. A D8 is pushing and an M7 is pulling with an 18-foot length of 1-inch steel-wire cable.

work day; occasionally 3,000 yards a day was maintained when conditions were right.

The material was spread in 6-inch lifts and compacted by a Blaw-Knox sheepsfoot roller pulled by a D6 tractor. Enough natural moisture was contained in the dirt so that no wetting of the fills was required. Final shaping was done by two motor graders—a Caterpillar No. 12 and an Adams No. 511. The runway has a center crown with 1 per cent grades both ways continuing from the pavement out over the shoulders.

Once the field was drained, the sandy soil was graded without too much difficulty, but the presence of muck pockets made earth-moving difficult at times. In some old creek beds and former cypress swamps the muck was from 1 to 5 feet deep. This unsuitable material was removed with dozers, and distributed over the field by the earth-moving equipment. It was spread over the areas to be paved and also the portions of the field to be graded only. By spreading an average 2-inch layer of muck over the fine sand and then mixing the two materials, the contractor stabilized the resulting soil under the paved areas to 35-pound bearing value per square inch.

The mixing of muck and sand was effected to a depth of 12 inches with a Hester plow pulled by an M7 tractor. The sheepsfoot roller made several passes over this soil which was then re-bladed by the motor graders. The grading was completed so that paving operations were started the first part of May.

Fuel for the earth-moving equipment was furnished by the Shell Oil Co. and delivered at the job site by truck from Panama City. Machines were greased at least once and sometimes twice daily by a service truck outfitted with a pressure grease gun powered by a Curtis air compressor.

Sand-Asphalt Pavement

Paving of the runway and taxiway consists of a 6 and 7-inch layer of sand-asphalt. Local material was used for the aggregate, and mixed in place
(Concluded on next page)

THE JOB

PRODUCING STONE SAND FOR ALLATOONA DAM

THE EQUIPMENT

TWO CEDARAPIDS HAMMERMILLS

THE CONTRACTOR

LAMBERT BROS., INC.
Knoxville, Tenn.

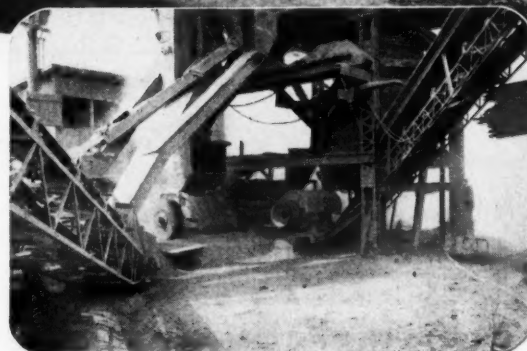
SINCE no natural sand was available for the 500,000 cu. yd. of concrete in this huge southern dam, all of it had to be produced from quarry rock near the project. After several trials with various types of crushers, Cedarapids Hammermills were found to be the only equipment that could economically produce the necessary volume of sand with the following specifications:

Sieve Designation U. S. Standard Sq. Mesh	Cumulative Percentage by Weight	
	Retained	Passing
3/8"	100	0
No. 4	95-100	0-5
No. 8	80-90	10-20
No. 16	55-75	25-45
No. 30	30-60	40-70
No. 50	12-30	70-88
No. 100	6-11	89-94

Fineness modulus of not less than 2.34 and not more than 3.22

This is another typical example of how Cedarapids equipment has enabled contractors and aggregate producers to fill their contracts on time and at a profit. When you buy aggregate producing equipment, follow the lead of the successful producers—buy the best—buy Cedarapids.

IOWA MANUFACTURING COMPANY
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Hughes New Low-Beds
15 to 100 Tons

Used jobs also available

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ROCK AND GRAVEL CRUSHERS • BELT CONVEYORS
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PORTABLE POWER CONVEYORS
PORTABLE STONE PLANTS
PORTABLE GRAVEL PLANTS • REDUCTION CRUSHERS
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DRAG SCRAPER TANKS • TRACTOR-CRUSHER PLANTS
WASHING PLANTS • KUBIT IMPACT BREAKERS
STEEL TRUCKS AND TRAILERS



C. & E. M. Photo

Workers of the Smith Engineering & Construction Co. grease the rollers on a D7 tractor which is pulling a LeTourneau LS 8-yard finishing pan. The grease rigs are powered by a Curtis air compressor.

Sand-Asphalt Runway For Class 3 Airport

(Continued from preceding page)

by a Wood Roadmixer pulled by a D8 tractor. The bitumen was an RC-1 asphalt supplied by the Pan American Petroleum Corp. of Tallahassee, Fla. The material was fed to the Roadmixer by Great Dane 4,000-gallon relay tanks pulled by Mack trucks, and applied to the native soil at the rate of $4\frac{1}{2}$ gallons to the square yard. The mixing started at one end of the runway and continued in 8-foot lanes up and down until the job was completed. The bitumen was not heated.

The day following the mixing, the material was aerated for another day or two by disks pulled by a tractor, then compacted by the sheepsfoot roller. Next it was shaped by the motor-grader blades and rolled by a 10-ton tandem Buffalo-Springfield. The runway and taxiway were then ready for use. The areas which were graded but not paved were seeded with Bermuda grass.

To pave the concrete apron, a batch plant was set up on the site and the job was done with a 27-E paver. The 200 x 175-foot area was paved in seven 25-foot lanes with 7-inch plain concrete. Dummy joints were on 20-foot centers. After the final screeding, tie-down anchors were embedded in the concrete, spaced 25 feet on centers longitudinally and 20 feet transversely. Planes are moored to them by ropes.

The 31 x 40-foot one-story concrete-masonry administration building was also built under this contract. A wire-mesh fence, $5\frac{1}{2}$ feet high, was erected

to keep livestock from grazing on the airport. It runs from Robinson Bayou to Big Goose Bayou. Lighting conduit was also installed.

Sometime in the near future the State Road Department of Florida will pave the dirt road that now runs out to the airport from Panama City. Ample room is also provided at the airport for the construction of two future runways and taxiways, and for an addition to the apron if and when this becomes necessary.

Quantities and Personnel

The major items of the contract included the following:

Excavation	110,000 cu. yds.
Ditch excavation	30,000 cu. yds.
Muck excavation	12,000 cu. yds.
Clearing	88 acres
Grassing	54 acres
Concrete pipe, 24 and 30-inch	1,000 lin. ft.
Sand-asphalt pavement	75,000 sq. yds.
RC-1 asphalt	330,000 gals.
Concrete apron	3,900 sq. yds.
Wire fence	502 rods

The Smith Engineering & Construction Co. of Pensacola was represented on the Bay County Airport construc-

tion by Frank D. Rials, Superintendent. R. W. Burdick was Supervising Engineer for the engineering firm of Smith & Gillespie of Jacksonville. Herbert Mizell, Sr., represented the Panama City Airport Authority.

Crackfillers, Pouring Pots

Features of its improved line of crackfillers and pouring cans are described in literature issued by the Butler Industries, Inc., 6450 LeGrand, Detroit 11, Mich. Illustrated on the sheet are the Model A insulated crackfiller, and the Model B rigged as a pouring can or as a crackfiller.

The bulletin describes these Butler products, and gives complete specifications for both models. It tells how the equipment is best used, and the materials with which to use it. Also described are the Butler nozzles and pouring spouts.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 61.

How do you measure Economy?



... low fuel costs?

... minimum maintenance?

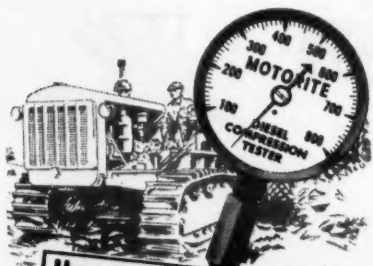
... long engine life?

Cummins Diesels have all of these ...

For example, Nathan Moore, Alhambra, Calif., contractor, currently operating six Cummins-powered Super C Tournapulls on a job at Kernville, Calif., has completed jobs as much as 90 days ahead of schedule with his earth-moving equipment. The Moore fleet of Tournapulls, all powered by Model HBID-600 Cummins Diesels, has run for periods of more than eight months without a single engine overhaul. This contractor also uses Cummins Diesels in one Mack and two Kenworth trucks.



CUMMINS ENGINE COMPANY, INC. • COLUMBUS, INDIANA



How to Stop DIESEL TROUBLES Before They Start

The compression-ignition principle of Diesel engines makes regular checks of compression of all cylinders vitally important. Maintaining correct compression pays off. It means keeping your Diesels running at peak efficiency. The result is greater operating efficiency, longer engine life, and lower maintenance costs.

The MOTORITE Diesel Compression Tester simplifies checking compression pressure. It is easily attachable to any make of Diesel by means of an interchangeable adapter which takes place of the fuel injector. In addition to a "universal" adapter which serves more than 50 makes and types of Diesels, we have a complete line of special adapters for practically every commonly-used Diesel.

For full particulars write for Leaflet 605.

ATTENTION Distributors: Diesel equipment and accessory jobbers are invited to write for information about attractive distribution proposition.

BACHARACH INDUSTRIAL INSTRUMENT CO.
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Virginia Dept. of Highways Photo

A Virginia survey party reported this severe break-up of Route 154 in Prince George County. The road is in the coastal-plain area where a high water table contributes to poor performance.

State Does Survey On Road Failures

Virginia Research Probes Into Conditions Causing Spring Break-Ups; Will Influence New Road Work

LONG before last winter's severe weather had run its course, the Virginia Department of Highways realized that it would be one of the worst winters on record, and would cause severe damage to the state's highway system. Accordingly the Department planned intensive research of the damage to determine the major causes of road failures which invariably follow spring thawing. This state-wide survey started the middle of February and was completed by April 1, covering some 45,000 miles of roads. Virginia's system of state-owned roads totals 47,000 miles, of which 9,000 miles are primary and 38,000 miles are secondary highways. Only three counties in Virginia maintain their own county roads.

From this research project the Department engineers have collected all possible information concerning the condition of nearly every road in the state, with particular emphasis on the behavior of low-type pavements. The latter were stressed because of the great mileage concerned. All except 5,000 of Virginia's 47,000 miles have some kind of surfacing. Only in recent years have road sub-bases been stabilized, and so far little research has been conducted to determine their behavior. With the findings of this survey, the engineers can study the relationship of road performance to soil areas, pavement types and similar data, which will be a definite contribution to road-building methods throughout the nation.

Well Timed Survey

In no winter since 1935-1936 have there been deeper freezes, quicker thaws, heavier loads, or more traffic on Virginia's highways than last winter. While these factors brought about a serious road emergency, they combined to provide ideal conditions for a research project probing into road failures. The subgrade support was then at a minimum, and if a road was going to break up at all it would do so at that time. Then too, the men to conduct the survey were available during the off season of construction activity.

The survey consisted of an inspection, logging, and description of failure types (surface or base), and a rating of performance. At the same time information was collected where possible on pavement thickness, soil texture, topography, position of the grade line with respect to ground surface and water table, general drainage conditions, and any other items affecting performance. Typical failures as well as

examples of good performance were photographed as a means of recording actual conditions.

In addition to the field survey an analysis was made of weather records throughout the state, and these data were correlated with existing road conditions. Reports were obtained from sixteen U. S. Government weather stations scattered throughout the state. The reports studied extended back to the winter of 1917-1918, which, incidentally, was also a severe winter. By "severe," the highway engineer does not necessarily mean a season of heavy snow, for a thick blanket of snow usually protects the ground and the roads with it. The worst conditions, as far as roads are concerned, are brought about by alternate cycles of freezing and thawing along with heavy precipitation.

Last winter was a season of heavy precipitation, and by February the ground was covered with snow and ice with accompanying cold weather. Suddenly the temperature zoomed up

to 70 degrees F, and rains accompanied the fast-breaking thaw. The soaked subgrade turned into practically a slurry, and all the bearing power of

the soil went out of the ground. The break-up of the highways began at this time.

(Continued on next page)

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The accepted air entraining agent for concrete
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The Jaeger Machine Co.
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The T. L. Smith Company
Milwaukee, Wis.

The Knickerbocker Co.
Jackson, Mich.



Virginia Dept. of Highways Photo
The Virginia research project recorded good pavement performance as well as bad. This "good" example of three-lane macadam pavement is in Prince Edward County, Route 460.

State Does Survey On Road Failures

(Continued from preceding page)

From these reports, the research engineers have charted temperatures, snowfall, total precipitation, and other data over this 30-year period. They have summarized their findings county by county and district by district over the entire state.

Another phase of the investigation included a study of traffic conditions, particularly those prevailing on roads with restricted loads. The field parties were alerted for any conditions encountered where there was evidence that damage to the roads was being done by excessive loads. In mid-February emergency load limits were imposed on many roads of the state. Most interstate routes retained their present 40,000-pound limit, but many other primary routes were restricted to 24,000 pounds, and virtually all secondary routes were posted for 16,000 pounds.

Organization

The Research Section of the State Highway Department was given the responsibility of conducting the survey. The District Materials Engineers, District Soil Engineers, and several members of the Testing Division staff were assigned to the survey. The District Materials Engineer was in charge of the survey, and responsible for its conduct in each district. Four or five field parties, consisting of a driver and recorder, were organized in each district. Specific instructions were given as to the methods of making the survey and the records to be kept.

The field parties worked in close cooperation with the District Engineer and the Resident Engineer, and checked with the latter at least once a day. When extensive or severe failures were encountered, they were called to the attention of the Resident Engineer so that they could be corrected and thus expedite traffic. At the same time, any other items relating to road conditions were reported immediately to the Resident Engineer.

In the two-man party the driver was usually a road patrolman who knew the territory well. The recorder took down the data and made the photographs. They had a list of road sections by counties which was prepared by the

Auditing Division and contained the following information: (1) county code, (2) route number, (3) surface type, (4) base type, (5) road width, (6) extent, (7) length. In addition, each field party was furnished the following supplies and equipment: field notebook (one for each county), code of counties, code for base and surface types, county map, state map, list of resident engineers and counties in each residency, colored pencils, pick, shovel, scale or ruler, camera and supply of film.

Procedure of Survey

The survey was made by driving over each section of road, noting and recording existing conditions in a field notebook. While different conditions prevailed throughout the state because of climatic, physiographical, soil, and traffic differences, the same general procedure was followed in all districts. For each road section, the following information was recorded in the county field notebook: survey party, date inspected, weather conditions, log of



Virginia Dept. of Highways Photo
This base failure of a road in Culpeper County, in the Triassic Red Bed area, was recorded in Virginia's survey of damage caused by the severe winter of 1947-1948.

section locating type and extent of failures, topography, type and condition

of base and surface, predominating
(Concluded on next page)

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- EQUAL LOAD DISTRIBUTION ON BOTH AXLES
- FOUR-POINT SUPPORT WHEN LOADING
- HEAVY DUTY FRAME WITH DEEP "H" BEAM AXLES
- TWO-INCH HARDWOOD TRANSVERSE FLOORING
- AMPLE-SIZE ALLOY STEEL KING-PIN BOLT
- QUALITY ENGINEERING AND CONSTRUCTION THROUGHOUT

HERE'S WHAT YOU GET AS STANDARD EQUIPMENT—

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soil texture, position of grade line with respect to ground surface and water table, drainage conditions, unusual traffic conditions, width of shoulders, and any other data pertinent to performance.

Immediately after inspecting and logging a given section, an estimate was made of the degree of distress, and a rating was given on the basis of the following arbitrary evaluations:

Rating	Description
1. Excellent performance	Roads showing no break-up and in perfect condition.
2. Good performance	Roads showing only a slight amount of distress, such as an occasional alligator crack or some surface raveling.
3. Slight distress	Those roads with less than 5 per cent of the total area showing base and surface movement.
4. Secondary distress	Those roads showing 5 to 20 per cent of the total area with movement in the base and surface.
5. Primary failure	Those roads with over 20 per cent of the surface showing base and surface movement.

On soil or unsurfaced roads the descriptions and ratings differed slightly as follows:

Rating	Description
1. Excellent	Remained smooth with no break-ups.
2. Good	No break-up. Slick in places, but no ruts deeper than an inch. Traffic moving in high gear on entire section.
3. Fair	Not over 5 per cent badly rutted so as to force traffic to change gears.
4. Poor	From 5 to 20 per cent badly rutted. Traffic may get stuck in places.
5. Very poor	Over 20 per cent of surface badly rutted. Very difficult for traffic to pass without getting stuck.

As soon as the rating had been estimated, the road was colored on the county map according to the following scheme: Rating 1—blue; Rating 2—green; Rating 3—brown; Rating 4—orange; and Rating 5—red. Uniform ratings and color schemes were used in all districts.

Wherever possible, pictures were taken to record typical road conditions. These included examples of good performances as well as poor. Records were kept for identifying the picture at a later date, and included a caption describing what the picture illustrated. In a close-up, a ruler or some other object was put in the picture to permit a conception of relative size.

Data were also collected on the depth of base whenever possible, particularly where failures were encountered. All information concerning the depth of frost penetration at the time of survey was included in the notes. A description of the relative performance in cuts and fills and the shoulder width was included, also the relative age of the pavement if it was known.

At the end of each day the field party summarized the day's work, listing the road sections surveyed, and the number of miles in each classification. This information was given to the District Materials Engineer who made a weekly report to the Research Section. Road damage by floods was noted, and recorded separately from that by spring break-up.

Typical Road Section Notes

Following is a typical page from a field notebook:

Survey Party—J. R. Doe, Driver, and R. T. Smith,
Recorder
Date—Feb. 17, 1948
Weather—Clear and Cool. Temperature—Around 37 degrees

Rt. 606—Section 0012

Speedometer Reading	Remarks
30126.0	Begin at Route 612
30126.5	Slight amount of alligator cracking in cuts
30127.8	Slight amount of alligator cracking in cuts
30128.2	Base failure in cut—1-inch surface 6-inch stabilized gravel base in silty clay subgrade
30129.4	End section at Rt. 610

This section is in gently rolling topography—grade line generally good and slightly above surrounding ground. The predominant soil texture is sandy silt, with some silty clay in the cuts. All distress found was in cut sections as noted. Drainage generally good. Shoulders 6 feet wide. Recent construction. Section rated 3 (slight distress).

Rt. 606—Section 0012
3.4 miles

Each of the eight districts had four or five survey parties, with a party covering two or three counties as a rule. The state took over the county roads in 1932, and their condition varied widely at the time and still does to a certain extent.

Summary

Damage to the roads also varied greatly, chiefly according to the four factors of climate, soil area, traffic, and design of pavement—thickness, type, etc. Thus the coastal-plain areas were the victims of a high water table making drainage difficult. The Culpeper district in northern Virginia has plastic soil of sandstone and shale resulting in poor internal drainage. In the mountains of southwestern Virginia, where

the Bristol district is located, the roads take a heavy pounding from trucks engaged in coal strip-mining operations. On the other hand, the damage in some districts was slight, or no worse than the usual damage after the average normal winter.

The survey gives a state-wide picture of road conditions at the worst possible time of year. From this data, a master plan was worked up for each county in order to assign priority to maintenance operations on the damaged roads. The survey has also pointed out some items on which more detailed research studies are desired. The results of the study will be helpful in establishing future Departmental policies regarding construction and maintenance practices and procedures.

The research project is under the direction of Tilton E. Shelburne, Director of Research. The Virginia Department of Highways is headed by James A. Anderson, Commissioner. C. S. Mullen is Chief Engineer.

Raybestos Appointments

A. L. Hawk is named Assistant to the Western District Manager in Chicago, by the Manhattan Rubber Division of Raybestos-Manhattan, Inc. And R. B. Hazard is named Manager of Distributor Sales for the Western District. Mr. Hawk formerly was Manager of Distributor Sales, Western District; while Mr. Hazard represented the Asbestos Textile & Packing Division in the Minneapolis territory.



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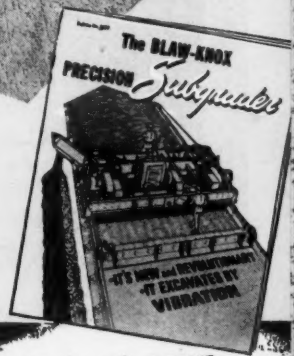
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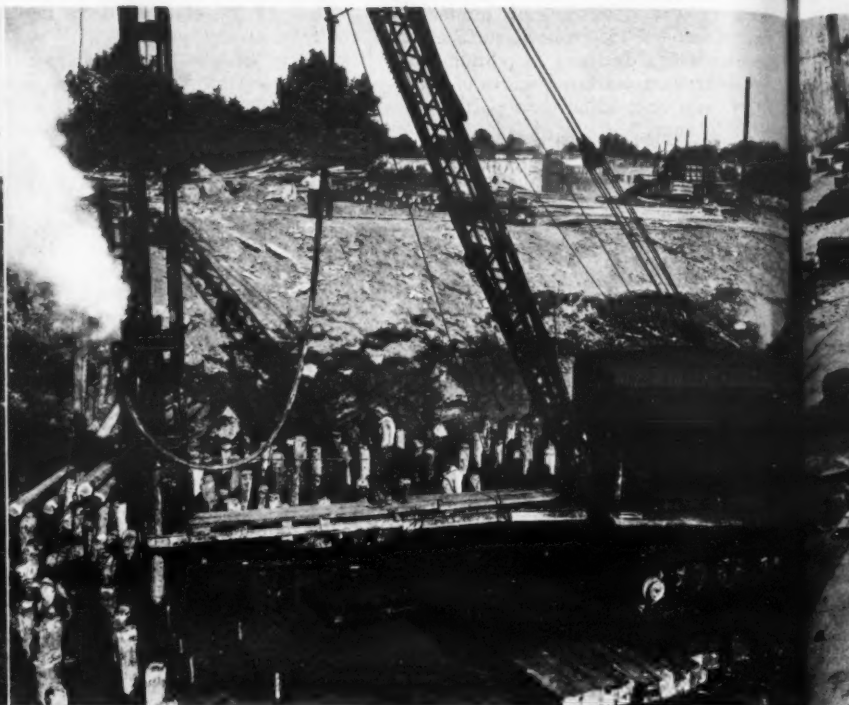
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EXCAVATION. Soft clay subsoil and heavy ground water complicated excavation for the Kissena Corridor concrete storm sewer recently built in the Borough of Queens, New York City. Here's a typical view of digging, doring, and unwatering on one of the eight contracts—Tully & DiNapoli's 5,785-foot section.



PILE FOUNDATIONS. Where subsoil was poor, timber piles 18 to 50 feet long were driven down to good sand bearing strata to support the concrete-pipe sewer. Here a steam rig, using a McKiernan-Terry 9B3 hammer and supported on heavy timbers, works on the Charles F. Vachris contract.



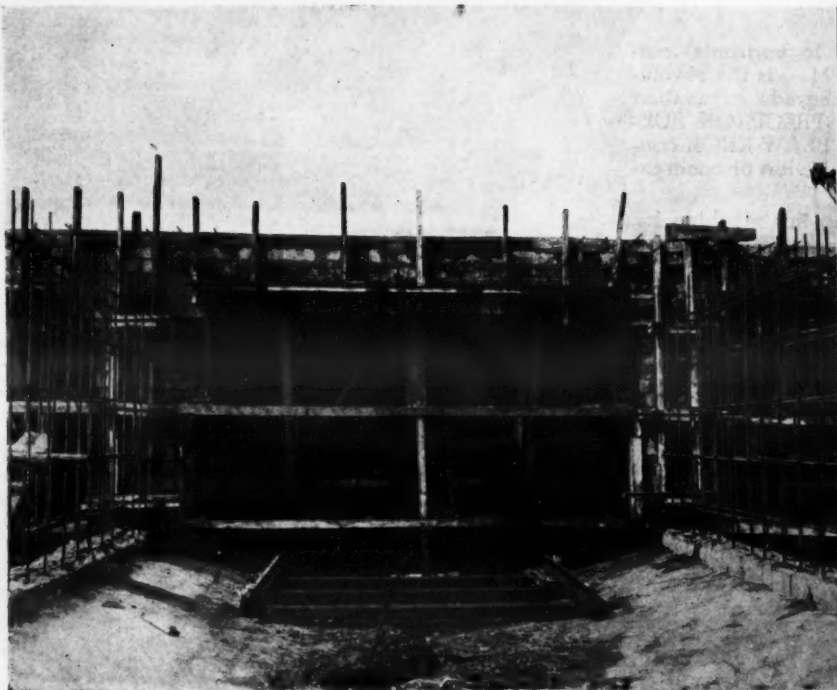
Concrete Storm Drains

(C. & E. M. and President of Borough of Queens Photos)

(See article on page 26)

TIMBER SHEETING. At street crossings or where structures were close by, steel H-beams were driven to support the sides of the trench, and horizontal sheeting boards 8 feet long were inserted behind the beam flanges. This view of the sewer roof on a completed section shows sheeting and cross-bracing still in place.

INVERT POUR. invert walling o
screeded even o



FORMS. Each barrel of the sewer had a separate Mayo collapsible steel form 40 feet long, shaped exactly to the inside dimensions of the walls and roof of the sewer, and mounted on carriages that moved on rails. Richmond Tyscrus held the wood forms for the outside walls to the inner steel form to assure proper wall thickness.



INSIDE VIEW. Here the invert and part of the walls of a triple-barrel section were poured. At the sides and top is special shoring which Vachris used on this section of its 3,100-foot contract, where the sewer goes under Lawrence Street in a 40-foot-deep cut.



WOOD DECKING. A 3-inch plank decking built on the piles served as the bottom form for the sewer invert. The pile heads were left projecting 6 inches above the deck and were encased in the concrete invert. Where piles were not needed, the invert was poured on sand or gravel foundation or on a 6-inch course of broken stone.

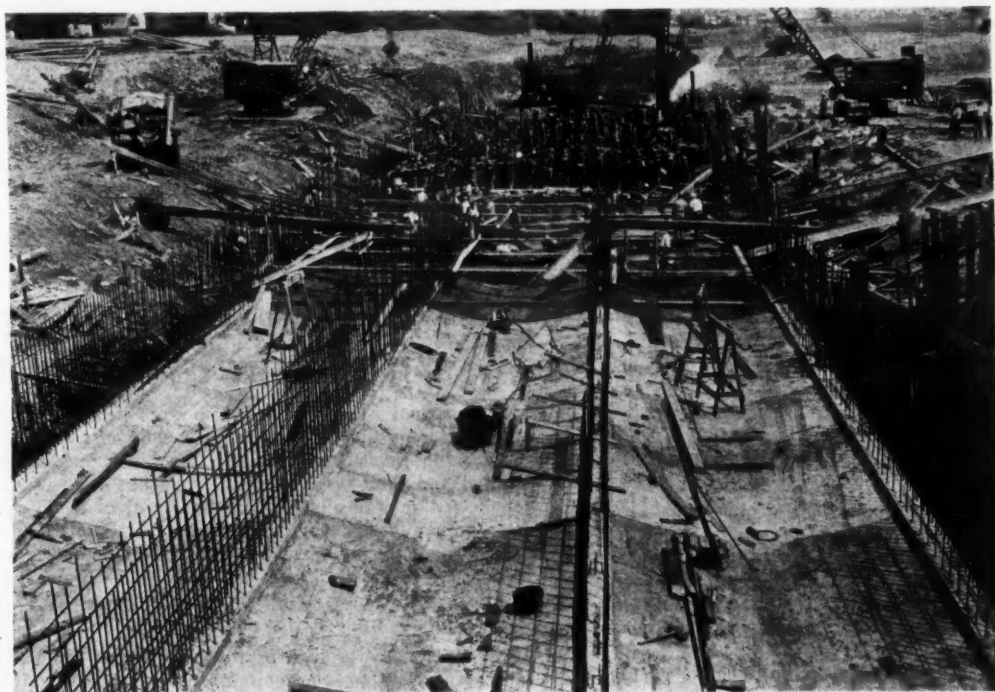


UNWATERING. Where the sewer passes under Blossom Street in Flushing, Vachris, Inc., unwatered the ground with a Moretrench 8-inch pump and wellpoint system. Two-inch risers 18 feet long were attached every 5 feet on the 8-inch header line.

Sporm Sewer s 6,300 Acres

Maximum 3-Barrel Width
Of 2½-Mile Structure in Borough
Of Queens, N. Y. C., Is 54 Feet

INVERT POUR. To form the curved invert base in this triple-barrel section of the 2½-mile-long sewer, screed irons bent to the radius of the invert were on 10-foot centers from the wooden curb forms, and concrete was screeded every two irons. Notice the double rows of wall reinforcement to provide for positive and negative bending.



WALL AND ROOF POUR. Bottom-dump buckets handled by cranes—here a Wiley 2¼-yard model on the 70-foot boom of a Northwest unit—placed most of the truck-mixed concrete on the Vachris contract. In the foreground of this photo is a Mall vibrator in use.



PERSONNEL. John J. Picone, left, was Assistant Superintendent for Vachris, Inc. Francis P. Keegan, next in line, was Section Engineer of the whole project for the Borough of Queens Bureau of Engineering-Construction. Anthony V. Troy was Superintendent for Vachris, and Leonard Vaccaro was Engineer. John Cullinane was Keegan's Assistant Section Engineer, and Andrew McGrattan was Resident Engineer.

Levees, Revetment Retard Bank Scour

**Erosion-Prevention Work
Installed at New Bridge
To Prevent Destructive
Wash on Mile-Long Job**

ONE of the important preliminary contracts in the new Liberty Bend Cut-off of the Missouri River 20 miles below Kansas City is a \$625,000 job being done for the Kansas City District Office of the Corps of Engineers by George Bennett Construction Co. of Kansas City, Kans.

There, on the outside curve of the new channel line along the left bank of the river, elaborate revetment work is under way. A willow mattress to prevent sand scour along the river toe is being woven and sunk. Piles are being driven to hold the mat in place. The bank is being graded by dragline, and then covered with stone riprap. Finally, back of this work are rising the first sections of the levee system under the Pick-Sloan plan for the Missouri River.

Despite fluctuating river stages, a shortage of river craft, and certain problems peculiar to this work to be detailed later, the job is going along nicely, and will be finished by October 31, 1948—about 13 months after it began.

Necessity for Work

A new mile-long cut-off across a neck of land south of Liberty, Mo., will eliminate a long horseshoe bend, accelerate local river velocity, and drop the level of the river all along the important industrial waterfront at Kansas City. The new 1,600-foot bridge which will span the new channel is now under way also.

When the bridge is finished, a pilot canal will be dredged up through the center of the new 900-foot stream channel. When the mighty Missouri starts down through this narrow pilot canal, rapid erosion and bank caving will occur. The bank revetment and mat along the left bank, which is the outside of the curve, will hold the river where the engineers want it to go when it widens out to that point. The levees, which are going in on both banks of the stream about 450 feet back of the channel lines, are a further safeguard against flood protection if the river comes up above the present banks.

The levees are now finished; work on them was begun last autumn.

Levee Work

The sand-silt levees were designed with a 10-foot crown and 3 to 1 side slopes, and they average about 10 feet high above the natural ground surface. Specifications called for the sand and silt for these levees to be excavated from the future stream-channel area. Mild requirements as to soil density

permitted the soil to be semi-compacted in 8-inch lifts with 4 passes of a sheep-foot roller.

Length of haul averaged 500 feet one way. Five Model C Tournapulls moved in, with three units of D8 Caterpillar tractors and Wooldridge scrapers. Two of these scrapers were of 14-cubic-yard

capacity; one carried 12 yards. No water-sprinkling equipment was needed on account of the near-optimum content of the pit. Two sets of LeTourneau sheepfoot rollers were used behind Caterpillar tractors, and a D8 pusher tractor was used in the borrow pit.

Five Koehring Dumpers were also

work, with a Northwest Model 6 dragline and a Hendrix bucket doing the loading.

The levees were built up in sections about 1,000 feet long, and the side slopes were trimmed by bulldozers. No seeding was done under the Bennett

(Continued on next page)

At Muroc, California- TOURNALAYER BUILDS 100 MASONRY HOMES



PROVIDES 200 SQUARE FEET EXTRA AT LOWEST BID PRICE!

100 masonry homes have just been built near California's Muroc Air Base by the famous Tournalayer Method! They are now being finished as beautiful, livable homes for Base personnel and their families. Each home has 1344 square feet of space within its walls—200 square feet of living space more than minimum bid specifications! . . . All 100 of these beautiful LeTourneau homes have been built around a compact, basic plan that provides 2 bedrooms, a large 23' x 18' living room, kitchen, dining room, bathroom, and service porch . . . And they were built for the job's lowest bid price!

LeTourneau homes such as these at Muroc are well adapted to the unit system of architectural design and can be placed wherever desired. They are not prefabricated—they are permanent masonry homes that any builder or contractor can design individually, yet mass produce and sell for less than the price of a conventional house. LeTourneau homes are the answer to the tough problems involved in mass home-building operations. Write today for more information!

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U. S. Engineers supervise Muroc job, which is almost complete despite extreme weather conditions that included rain, snow, hail, sand storms, and temperatures that ranged from over 110° to less than 10° F.

Insulating concrete cuts job costs—Here a big capacity Tournalayer places insulating concrete at Muroc—concrete that eliminates need for furring, lathing, plastering, and cuts maintenance costs to a minimum. The durable structures formed are fireproof, windstorm and quake-proof . . . This means secure, comfortable living!



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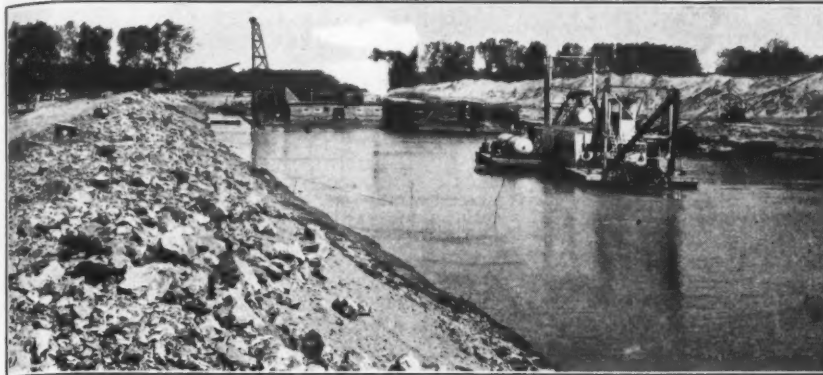
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See pages 16 and 85

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Above is a general view of the revetment work at the Liberty Bend Cut-Off on the Missouri River. In the foreground, bank riprap is being dumped at the top of the slope. The dredge One O Four is working in the channel. In the background are the pile driver and barges of brush. Mat weaving is going on behind the pile driver. In the second photo are Resident Engineer C. R. Perry for the U. S. Engineers (left) and W. A. Lynn, President of the W. A. Lynn Co. Behind them, men throw rock ballast on the mat.



contract, but this work will soon be started.

The Bennett company, with plenty of earth-moving experience on this and highway work, thoroughly believes in the basic relationship between soil compaction and the productivity of its equipment. In none-too-good soil, the rollers were often worked more than the specifications called for, according to the resident engineer, because the contractor's superintendent realized his machines would make better time if the levee was firm and passable at all times.

Open-Cut Dredging

In order to build a channel deep enough to let the erosion-prevention mattress be sunk to its projected depth of 8 feet below low water, extensive excavation was done. A channel about 200 feet wide at the top and 60 feet wide at the bottom was opened up.

The yardage from the top of the ground to the water table was all dug by a Northwest Model 6 and a Northwest 95 dragline, and either cast or hauled by the Koehring Dumpers to a near-by spoil ground, where the new river will take it away. The cast material was used to throw up a levee about 12 feet high above the outer bank of the pilot channel.

A subcontract was let to the Omaha Dredge & Dock Co. to pump the under-water yardage, leaving 8 feet of water below Construction Reference Plane (CRP, or low water) ahead of the mattress-weaving operation. The little 10-inch cutterhead dredge One O Four came down the river under tow to do this work.

Mounted on a steel hull 24 x 80 x 4 feet, the One O Four could reach all parts of the channel with one swing, and could dig the full bank to project depth on the first pass. Many of her engines were old, but still remarkably serviceable.

A venerable Caterpillar Sixty engine, hooked to a 50-kw generator, produced the electricity for the 30-hp cutter motor. Her main 10-inch pump, made by Fremont Foundry, was driven by an old Twin City engine. Her swinging and spud gears were driven by a hoisting engine on the front end, hooked to a Ford V-8 engine. All her engines were fed with butane gas, hauled out to the job from Kansas City and transferred by truck to a large butane pressure tank on an auxiliary scow.

The suction pipe and stern discharge

pipe connections were made flexible by Goodrich rubber dredging sleeves, and the pipe line left the dredge at the stern on the port side. Of her 12-inch square spuds, the port spud was used

for digging. Walking ahead was done with the help of her starboard spud. Her swing lines were made fast to deadmen anchored in the channel banks. Two men in the crew dug these

deadmen holes, installed cable eyes, and walked the swing cables ahead as required.

Her discharge pipe line led up the (Continued on next page)



Remember the little boy who put his finger in the dike?

SCOOPMOBILE
did a
hero's
job
too!



A general air view of the disastrous Columbia River Flood, June, 1948.

The Oregonian

PORTLAND, OREGON, MONDAY, JUNE 14, 1948
VOL. LXXVIII—NO. 27344
PRICE FIVE CENTS

Sandbag Factory Invention of Flood Necessity



Reprinted from front page of The Portland Oregonian, June 14, 1948.

With flood waters of the Columbia river threatening the \$19,000,000 Reynolds Aluminum plant at Troutdale, Oregon, a unique "sandbag factory" was set up in the area with five Scoopmobiles and two Mixermobiles.

Sand was loaded into the skip of the MIXERMOBILES, put through the mixer drum and into the hopper. Burlap bags were filled out of the hopper and transported to the dikes with SCOOPMOBILES. This impromptu "sandbag factory" had a capacity of 240,000 sandbags a day, and was helpful in saving the valuable aluminum plant.

Another outstanding example of how SCOOPMOBILE and MIXERMOBILE can be put to use to complete your job — quicker and easier. This "flexible" construction equipment gives the ingenious contractor opportunity of cutting costly corners by mechanizing handling of construction materials.



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C. & E. M. Photos

Above, weavers work willows into a mat to prevent sand scour along the Missouri River. At right, mat weavers receive brush from the men in the background.

Levees, Revetment Retard Bank Scour

(Continued from preceding page)

bank and over the top of the levee. The dredged sand emptied back of the levee, waste water flowing on downstream towards the river. As a general rule, the dredge accounted for an average of 150 cubic yards per hour, and her production averaged about 3,600 cubic yards per day. Her maximum advance was 145 feet when the job was visited.

Pile Driving

The Omaha Dredge & Dock Co. sub-contracted driving of shore piles, willow-mattress weaving, crib construction, and rock ballasting to the W. A. Lynn Construction Co. of Lincoln, Nebr. A veteran riverman, W. A. "Billy" Lynn, is President of the company. Billy Lynn was for years a general superintendent for Woods Brothers Construction Co.

The engineers expected a heavy erosive surge along the left bank of the new channel. Accordingly they specified, as an extra precaution, wood shore piles on 5 instead of 20-foot centers, around which the willow mat was woven. The piles held the mat tight along the toe of the bank at the stream edge.

To drive these piles, Billy Lynn brought one of his big floating pile drivers down the river under tow. The pile driver he used had a wooden hull 80 x 26 x 6, a set of 55-foot wooden leads, a 3-drum American hoisting engine, a 125-hp steam locomotive-type boiler, and a Vulcan No. 2 single-acting pile hammer.

The wooden piles, generally about 23 feet long, were driven to a penetration of 20 feet in the river sand. These piles were brought in on rafts by a launch, picked up one at a time by the pile line, set in the leads under the Vulcan hammer, and driven to within 18 inches of grade. Later, after the willow mat had been woven around them, the piles were driven on down to grade.

Good pile-driving crews can sink

about 100 of these piles per shift, but because of the nearness of the dredge, and a desire on the part of the Superintendent not to get out too far ahead with pile driving, 43 piles in a shift

was the top number driven. The wood piles drove easily, and even at full

penetration they went down about 2 (Continued on next page)

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backfiller

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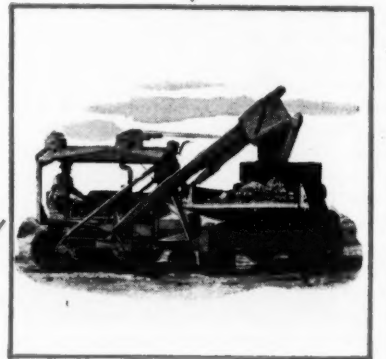
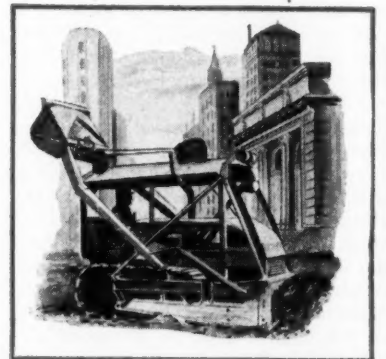
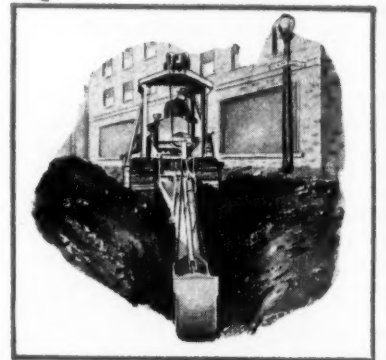
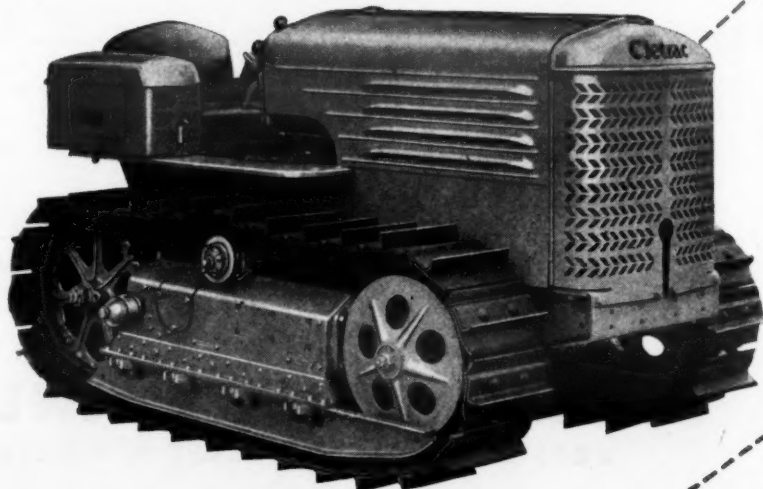
Converting the unit from Backhoe to Overhead is simplicity itself. Boom and bucket can be attached in an hour and detached in 10 minutes. Shovel arms and bucket can be attached and detached equally fast.

When you're not ditch-digging, this unit can be used to load sand, gravel, stone, debris or snow.

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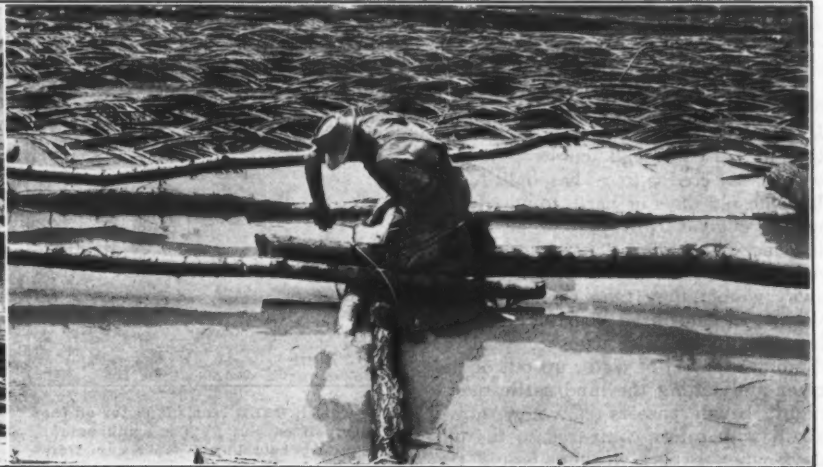
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C. & E. M. Photos

Workers, at left, carry crib poles to form the surface crib on the willow mattress for the Liberty Bend revetment job. The workman at right is fastening the crib with cable.

inches per blow.

Boiler water came from the channel on which the hull floated, and boiler burner fuel came down the river by barge.

Mattress Weaving

The next operation consisted of willow-mattress construction. Specifications called for a full 85-foot willow mat to be woven along the entire mile-long channel bank, with its inshore edge placed 9 feet up the slope from the point of intersection of the CRP line. An extra row of wood pole cribs was added on the inshore side, making a triple row of 8-foot square cribs instead of the usual two. These cribs were put on the surface and cabled down to hold the heavy ballast rock.

On the outside edge of the mat, a single row of 16-foot square cribs was built in the same way, and for the same purpose. Ballast rock and the close-knit willow mat, sunk down snug against the stream floor, will effectively prevent any erosion or undermining of the revetment proper.

Volume of the willow mat was calculated at 0.7 cord of brush per square. The willows, from 3/4 to 2 inches in diameter, were cut on an island shore across the river from the job, loaded loose on barges to a height of about 14 feet, and towed to the job by the 110-hp launch Red Wing.

A mat crew totaling about 32 men wove the mat, built cribs, installed cables, and ballasted the mat with stone. An 80 x 24-foot wood barge with an outrigger to pass over the wood shore piles was used to weave the mat. This barge had 13 fingers, or launching ways, leading down to the water. The weavers worked the willows into the mat in a cross-stitch pattern, working from these fingers.

A tight longitudinal selvage weave of willows made a neat willow border along each edge of the mat. When weaving had filled the fingers up to their top, capstan lines made fast to the bank were tightened at each end of the barge to pull the mat barge out from under the mat. The barge was stopped and tied up with about 6 feet of mat still resting on the fingers at each move.

Steel cables, 9/32-inch in diameter, were stretched above and underneath the willows on a 16-foot square grid pattern, and tied together where they crossed by Crosby clips. The cribs were made out of willow and cottonwood

logs not less than 6 inches in diameter at the butt, not less than 2 inches at the small end. These cribs also were fastened to the mat proper by cables.

A great percentage of the crew was fresh from Kansas City union hiring

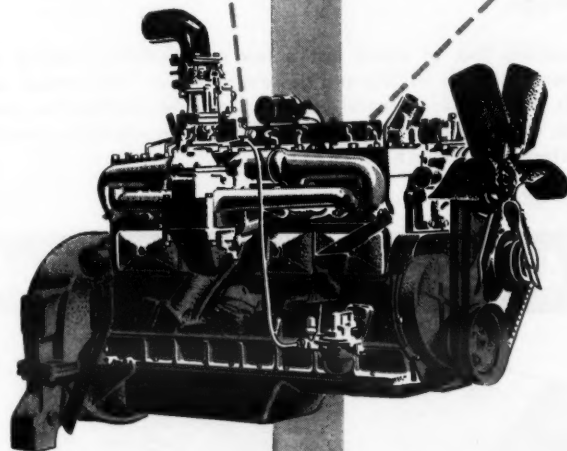
halls and new to river work. It was entirely different from the cussing, roaring mat crews of 1928—all veteran

rivermen then. As the mat foreman explained, "This crew is still, too silent". (Concluded on next page)



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Levees, Revetment Retard Bank Scour

(Continued from preceding page)

In the old days a mat crew kept up a line of chatter and cusswords that would do credit to a baseball team. But the old days of hard, tough rivermen are gone. Now they wear kapok life jackets if their job is hazardous; not one man in five can row a skiff in swift water; they take their drinking water in sterilized barrels out of dipping a barrel of water up out of the river and letting the mud settle overnight; brush passers can now move about with safety compared to the old days when expert weavers would try to put their eyes out with the brushy ends. But the daily footage this modern crew turns out is still reported as 145 feet.

Sinking the Mat

Each evening, usually just before quitting time, a section of mat is sunk, leaving perhaps 100 to 200 feet floating ahead of the mat barge. Men from the mattress crew do this work. They go over to the rock barge in the launch. The rock barge is set in with its long axis at right angles to the long axis of the mat. Head and stern lines crowd the barge into the mat as the men dump the rock overboard.

The select one-man stone for mat ballasting weighs from 25 to 150 pounds, and is well graded. The men throw off 1½ tons per square of mat; by figuring the contents of the barge, the foreman and inspector know just how far the barge load will cover.

From the inshore edge of the mat to a point 24 feet riverward of the CRP line, a 24-inch-thick compact layer of ballast rock is placed at the rate of 144 tons per 100-foot station. The specifications for this stone—as well as riprap for the bank slope—are more lenient. Quarry-run rock is used there, so long as not more than 5 per cent will pass a ½-inch mesh sieve. Many of the pieces are big—up to 150 pounds.

Rock in this compact layer is usually brought in by barge and clammed in by a Northwest dragline, working from the top of the slope. Sometimes the ballast crew also does this work.

Quarry and Bank Paving

Stone for ballast and riprap work was produced about a mile upstream from the job, and across the river, at an old abandoned mine. The limestone was broken up by drilling the outside ledge, and snake-hole drilling the inner mine stopes. Charges of powder brought the rock tumbling down.

Select ballast stone was then broken by sledge hammers, and stockpiled. Quarry-run stone was loaded to a fleet of various makes of dump trucks by a P&H shovel, and carried to a barge landing on the river. A D4 Caterpillar-mounted Traxcavator loaded broken rock inside the mine, and also came in



C. & E. M. Photo
Joe Tasler, USED Mat Inspector on the Liberty Bend job, gets a drink out of a sanitary barrel and paper cup. Note his kapok life jacket.

handy for moving some of the ballast rock.

Riprap work had not been started when this magazine's Western Editor visited the job, but it was planned to bring the rock in by dump trucks and

dump the loads at the top of the full 20-foot banks, previously graded on a 3 to 1 slope. The rock will be spread to a depth of 12 inches by a Caterpillar D8-mounted bulldozer, allowing a maximum amount of 0.6 ton per 100 square feet of bank.

Safety Is Enforced

Under the field direction of Army Safety Engineer Walter W. Kirchner, an excellent field program of safety was practiced, with the good cooperation of each contractor. Deck guards were installed on the dredge, kapok life vests were worn in over-water work, approved drinking water was used, and occupational hazards on this work were largely eliminated.

Even with a crew composed predominantly of green men, the accident frequency and severity rates were low. There was one drowning, and Rex Stuart of the Lynn organization collected \$1,000 for it. But it must be added hastily that the drowning was not connected with any of the workmen

on the job. A seaplane crashed in the river near Fairfax airport, drowning a passenger in the plane. Stuart found the body floating in the river, about a year after the crash. He collected the \$1,000 reward which had been offered.

Personnel

The job was designed and is being administered under the general supervision of Colonel P. D. Berrigan, USA, District Engineer of the Corps of Engineers at Kansas City. C. A. Philo is the Resident Engineer, with C. R. Perry in charge of this and two other large jobs in the area as Chief Inspector. Joe Tasler is the Mat Inspector.

The Bennett contracting organization is represented by General Superintendent J. K. Price, with Superintendent Glen Kistler in charge of work in the field. Harold Hubbard is Captain of the dredge for Omaha Dredge & Dock Co.

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The complete line, of which just a few representative models are shown here, includes electric and gas-engine driven flexible-shaft and hydraulic vibrators for general construction, light construction, mass concrete, street and highway paving, floors, form vibrating, product manufacture and other uses.

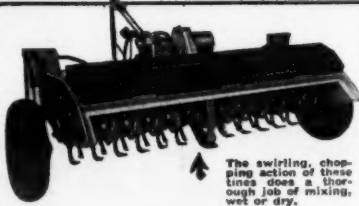
Model FS-7A Flexible Shaft, Electric. Excellent for thin sections. Exceptionally powerful for its small size. Available with 24", 36", 7' or 14' shafts—1½" x 17" and 2" x 10" heads, grinding attachment.

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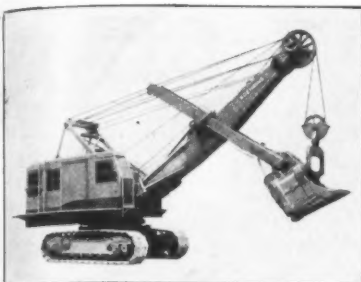
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ARIENS COMPANY BRILLION WISCONSIN



Koehring's entry into the 2½-yard excavator field was marked at the Road Show last month when a pilot model of the new No. 1005 was driven directly to the Show from its quarry test site.

New 2½-Yard Shovel Introduced at Show

A 2½-yar'd excavator was shown at the Road Show by the Koehring Co., 3026 W. Concordia Ave., Milwaukee 10, Wis. The pilot model of the No. 1005 was driven directly to the Show from its test site, so visitors had a chance to see how the machine stood up after 12 months in the quarry. This new shovel is the largest in the Koehring line, which previously ranged from ½ to 2-cubic-yard models.

Features claimed for the Model No. 1005 include a two-section chain crowd independent of the hoist; a self-equalizing 37-inch retract clutch designed to provide speed of operation with perfect control; 3-foot 9-inch boom-point sheaves for eliminating sharp cable bends; a non-torsional shipper shaft for extra strength; shock absorbers in the boom foot; tapered laggings on the hoist drum for power in digging and speed in hoisting; and an instantaneous dipper trip of the ratchet-and-pawl type.

The unit is convertible for use as a dragline or heavy-lift crane, and for clamshell work. It is diesel-powered and has a crane-lift capacity listed at 101,000 pounds with a 60-foot boom. The standard boom can be extended to 100 feet with 10 and 20-foot insert sections. In addition, the standard 30-inch crawler shoes can be replaced with 36 or 42-inch shoes on extra-long crawlers for additional lifting capacity and reduced ground bearing pressure.

According to the manufacturer, the 1005 as a shovel combines digging strength with top performance. It has a 4-foot power clutch equipped with compensator spring which is designed to change tension automatically for heat expansion. The crawler frames are separate from the car body to provide "give" in the excavator base. Positive traction-brake steering provides easy maneuverability. The upper machinery is grouped on a one-piece turntable for easy accessibility. A 26-foot box-section boom supports the 19½-foot double-dipper sticks at the mid-section.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 112.

Kit for Rotary Drill

A kit for its hand-held rotary rock drill and related accessories has been prepared by the Cleco Division of the Reed Roller Bit Co., Box 2119, Houston 1, Texas. The Cleco Handi-Drill is designed to hit and rotate at the same time. And it can be converted to a chipping hammer with the removal of one part.

The Handi-Drill kit contains a No. 0 line oiler, 6 feet of hose and necessary fittings, a pint of Cleco Pneu-Lube oil, a metal carrying case, padlock, instruction sheet, and a ½-inch open-end wrench. The shelf of the kit contains 16 star drills of various sizes and types, and 2 chisels. Spare parts included with the kit are 3 pawls, a pawl spring, a lock spring, a ratchet wheel, and a 1 B tool holder.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 102.

Improved Bidding System Coordinates Opening Dates

An improved bidding system has been O.K.'d by representatives of five Federal agencies which conduct major construction programs. Under the new system, bid-opening dates on similar types of construction projects involving \$1,000,000 or more will be coordinated to avoid conflicts in such dates with large non-Federal projects. The Associated General Contractors of America, Inc., is assisting in the plan.

The agreement was reached at a meeting of representatives of the Bureau of Reclamation, Department of the Interior; Bureau of Yards and Docks, Department of the Navy; Corps of Engineers, Department of the Army; Federal Works Agency, including the Bureau of Community Facilities, Public Buildings Administration, and Veterans Administration; and the AGC. The AGC agreed to participate by obtaining information on large state, municip-

pal, industrial, and commercial projects scheduled for bids, in order that Federal projects could be advertised without conflicting with similar non-Federal work slated in the same areas.

It was pointed out that no attempt would be made to control the dates on state, municipal, industrial, or commercial jobs, but that the information would be used to avoid conflict in advertising Federal projects of a similar

nature. This should benefit all interested parties.

Ceco Moves General Offices

The general offices of Ceco Steel Products Corp. are now located in the company's new office building at 5601 W. 26th St., Chicago 50, Ill. Ceco manufactures a complete line of metal construction products.

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MobiLoader to meet these tough loading conditions. That's real cost-cutting loading production that means bigger profits.

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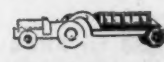
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Tough Winter Boosts County Road Upkeep

Maintenance Activities Gut Highway Budget as County Forces Struggle With Record Destruction

† LAST spring, G. B. Finley, State Highway Department Maintenance Engineer of Texas, issued a statement regarding the all-time record damage to Texas highways during the severe winter of 1947-48. Never before, according to Mr. Finley, had rain, snow, ice, and sleet combined to do so much damage to highways throughout the state.

Bad as the problem was from a state standpoint, it was even worse when viewed through the eyes of a county highway engineer. For there the budgets are lower; there the public is more prone to complain; there so many other factors enter into the picture.

Dallas County, in northeast Texas, with the city of Dallas as its county seat, has such problems. There in the Records Building is the office of R. H. Clinger, who in company with Judge Al Templeton and four county commissioners, is currently in charge of a big 1,800-mile main-highway system. That road system is groaning under the punishment it took last winter. And how the situation will be solved is, was, and will be a lesson in stretching the value of road dollars to the limit. For the total budget for the year is \$1,353,625.

Briefly, here is what happened: unseasonal freezes, heavy precipitation, and ever-increasing traffic loads near Dallas combined to break down many miles of double-penetration-surfaced highways throughout the county. The same thing, of course, is typical over most of the rest of the state. But the fact that Dallas County is largely metropolitan complicated the situation.

Physical Description

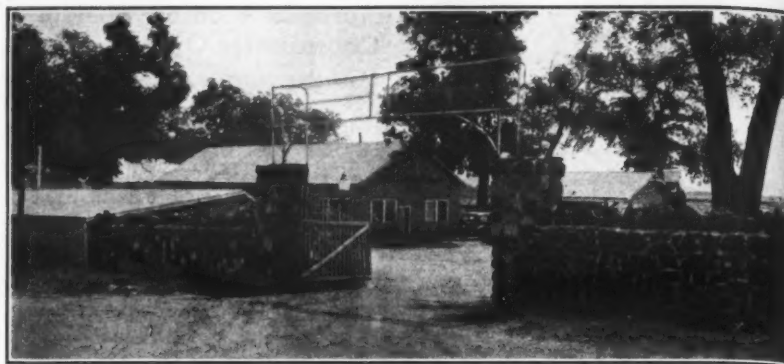
Dallas County is a flat-to-rolling expanse of land containing 893 square miles, and is crossed by several streams. Trinity River, on which flood-control work is now under way by the Army Engineers, crosses Dallas County roughly on a diagonal.

The county is the home of some 585,000 persons, with about 400,000 residing in Dallas and its environs. Winter temperatures in this area ordinarily stay somewhere in the low 20's in severe weather. The annual rainfall is 36 inches.

Of the 2,174 total miles under actual county maintenance, 1,138 miles are hard-surfaced. Except for 55 miles of concrete and 150 miles of macadam base and 2-inch asphalt concrete, they are low-cost highways on from 6 to 10 inches of flexible gravel or crushed-rock sub-base. Of the system, 533 miles are crushed gravel or rock: sub-base without surfacing. Only 103 miles are unsurfaced with either sub-base or asphalt, but county maintenance forces

keep these miles graded and drained under all but last winter's severe conditions. There are also 400 miles of county-maintained streets in some of the rapidly expanding subdivisions outside of Dallas. Technically, the County has no obligation to maintain them. Practically, though, it is impossible to dodge the issue when the people demand it.

About 100 miles of these streets now are surfaced, 200 more miles have the sub-base in place, and only 100 miles are unsurfaced. The practice by some rather unscrupulous real-estate subdividers of merely grading the streets in, leaving their improvement and maintenance to the County, has been responsible for the latter item. While the county commissioners have made a



Each of the four districts of Dallas County, Texas, has its own shop where mechanical repairs are made and where materials and heavy equipment not in use are stored. This is the entrance to the District 3 shop.

ruling which requires 6 inches of sub-base material on the streets in subdivisions, the rule has been eluded in a few places by a quirk of law.

The county roads are from 18 to 20 feet wide, with a few 22 and 40-foot sections, and they are set generally within a 60 or 120-foot right-of-way.

Highway and bridge-building standards have been brought up to Texas Highway Department specifications in the 20 years of County Engineer R. H. Clinger's tenure of office, so that as many good roads can be built as possible. Clinger is the first to point out

(Continued on next page)

THE cutter bar method of laying black top has been proved in many miles of all kinds of black top, both hot and cold.

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trol makes it possible to ride on the heel of the blade. A fine adjustment cares for banked or wedge courses and a simple control device assures any amount of adjustment for crown.

With the hydraulically controlled end gates, bleeding is easily handled and with cutter blade extensions black top can be laid up to 12 ft.

Here is just another of the many Adnun features that put the Adnun way ahead of competition and assures better black top road.

(Also see page 89)

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that they did not stand what the winter of 1947-48 had to offer. But it was the most severe test of all time, there in that part of the country. What is most important from the road builder's viewpoint is the system of roads—good roads—which were built at low cost.

As for hard-surfaced maintenance, Dallas County is concerned primarily with bituminous highways. Almost all the hard-surfaced roads come in that category.

County Organization

Highway building and maintenance functions are decentralized in Dallas County, but coordinated through meetings of the commissioners and the county engineer. The county is divided into four districts, each headed by a county commissioner.

Commissioner of District 1 is Lynn V. Lawther. Buck Frank is Commissioner in District 2. John Rowland and Denver Seale hold the same posts in District 3 and 4, respectively.

Each road district has its own headquarters, a shop where mechanical repairs are made, and storage space for materials and heavy equipment not in use. District 2, one of the largest of the lot, has a second auxiliary shop headquarters to make its road work more efficient.

Each district has a similar organization, and every effort is made to keep the job of each district as nearly equal as possible. The commissioner of the district is, of course, the head of the road organization. His job is elective, every two years. The county engineer's job is appointive.

In each district, a road supervisor directs highway construction and maintenance work. Under his immediate direction work a general foreman, an office bookkeeper, and a utility man whose job it is to locate repair parts and run odd errands.

Under the general foreman come the road gangs, each with their foreman, men, and equipment. The truck foreman in a district has an average of 37 3-cubic-yard dump trucks, with drag-lines for loading them. An asphalt foreman with a 10-man crew handles the asphalt from cars to the roads. Maintenance of bridges is a big job, and it requires a foreman with a 10-man gang. There is also a grading foreman who performs new and maintenance dirt-moving, and a miscellaneous gang which helps out in any emergency, such as the one experienced last winter.

Equipment for each district has also largely been standardized as to the number of units and their capacity.



District 3 of Dallas County, Texas, sprays asphalt on a road surface with an Etnyre pressure distributor. The County does a lot of single and double-penetration work.

Using District 1 as an example, the road builders there have two $\frac{3}{4}$ -yard drag-lines, a P&H and a Link-Belt Speeder; 37 dump trucks of various makes; 5 Caterpillar No. 12 motor graders; 1 Lorain Moto-Crane; 4 Allis-Chalmers

tractors with mowers; 2 steel-wheel rollers, 5 to 8-ton; a 7-cubic-foot concrete mixer; and a 1,000-gallon Etnyre pressure distributor.

The organizational set-up is such that equipment may be transferred between

commissioners when this is desirable or necessary.

Funds for the highway program come primarily from a tax levy of 23 cents per \$100 valuation on the \$440,000,000 assessed value of Dallas County. Added to this sum is a percentage of state automobile and truck registration license receipts, which under existing Texas state law cannot exceed \$175,000 per annum for any county. Fines and other miscellaneous receipts also go partly into the road fund.

This year Dallas County also issued \$409,500 worth of warrants for the purchase of equipment, lumber and piling, gravel and stone, gasoline and diesel fuel, culvert pipe, asphalt, and two small contracts. Austin Bridge Co. of Dallas was awarded a \$68,136 contract, and Texas Bitulphic Co. received a \$14,000 job for a short piece of high-grade hot-mix asphaltic concrete.

Maintenance Methods

Most of the county highways severely
(Concluded on next page)

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Sand—5,500,000 cubic yards of it to be moved through desert heat. Here, a fleet of six high speed self-propelled Terra-Cobras proved their ruggedness by making 10 to 15 trips per hour on hauls up to 1800 feet—18 hours per day, day after day! Here, again, was a dramatic demonstration of the many superior features of the Wooldridge Terra-Cobra—more proof that this modern high capacity earth moving equipment moves greater total yardages faster at lower cost and higher profits. You'll find the reason in the combined advantages of such proved Wooldridge features as positive two-wheel steering and traction, high degree of stability and load balance, heavy duty clutch and transmission, massive universal joint connection, non-jack-knifing safety features, spring loaded push-button, and independent three line cable control. Whether your problem is moving sticky mud, heavy rock, sand, or any type of dirt—you'll gain profit-making advantages with Wooldridge Terra-Cobras!



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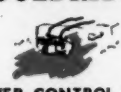
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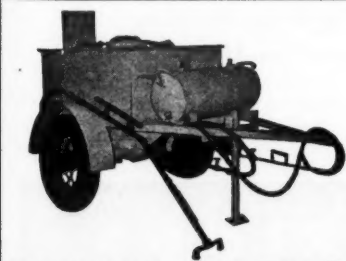
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ELKHART

INDIANA

Tough Winter Boosts County Road Upkeep

(Continued from preceding page)

damaged during the winter were repaired as quickly as possible. Dallas County uses methods of maintenance and construction patterned very closely after those of the Texas Highway Department.

The worst holes are filled immediately with crushed rock to rebuild the sub-base. Water is drained. When the county was visited in February, every available man and piece of equipment was being mobilized. The whole objective, according to County Engineer Clinger, was to get the road base drained off and damaged sub-base repaired to bear the weight of traffic the rest of the winter.

As soon as the roads were again dry and firm, sheepfoot and pneumatic rollers were brought in to re-compact the sub-base to good density. Motor graders dressed the surface as well as the sides.

"Hot stuff" gangs then moved in, bringing the pressure distributors filled with OA-230 heated to 300 degrees. The distributors sprayed the asphalt on the road surface, at a rate of from 0.5 to 0.6 gallon per square yard. Trucks with spreader boxes then backed up over the asphalt coat and laid 1 cubic yard of 3/8-inch-minus pea gravel or crushed stone to each 60 square yards of road surface. This coat of material was rolled down.

Depending on the ordinary volume of traffic, this single-penetration treatment may be repeated. Much single-penetration work is done as well as double-penetration. The gravel comes from strategically located pits throughout the county, and some crushed stone is also purchased.

Clinger does not contemplate any major change in construction standards simply because the 1947-1948 winter was the worst to visit Dallas County in recorded weather history. This does not mean that he would not like to. Money—or the lack of money, rather—is the same handicap to Clinger as it is to many another county engineer throughout the Country.

Recently an elaborate and complete plan was made for about \$11,000,000 worth of new construction, including a complete new by-pass belt route around the city of Dallas. When the plan was presented to the voters, however, it was defeated.

That will not deter Clinger and his road gangs from doing all they can within limitations of funds, however, for they have been carrying on now for two decades and it is their intention to continue to do so.

Uses of Hydraulic Jack

Listed in Service Manual

A 52-page service manual on the operation, care, and servicing of the Porto-Power tool has been prepared by the Blackhawk Mfg. Co. This tool is a hydraulic jack which, when equipped with various accessories, can be used

for pulling, spreading, clamping, pressing, pushing, bending, and lifting operations.


The Blackhawk service manual discusses the four principal parts of the tool in detail, and points out how they work in relation to each other. It shows how the various accessories are

attached to this basic unit, and describes the purpose of each. The manual also contains an entire page of recommended uses for the Porto-Power tool.

The major portion of the manual covers the actual steps to be followed in each operation to which the tool is

adapted. This section is thoroughly illustrated with photographs and diagrams which explain what is being done, and why.

Service Manual No. 248-P sells for \$1.00 and can be obtained by writing to the company at 5535 W. Rogers St., Milwaukee 1, Wis.



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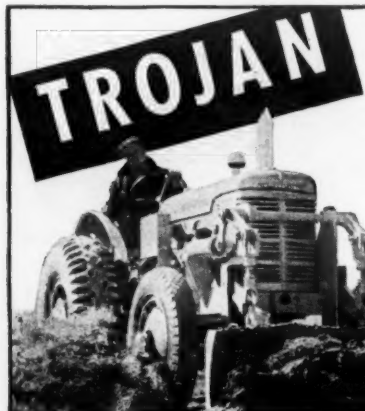
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able; adhering to AFBMA dimensions.

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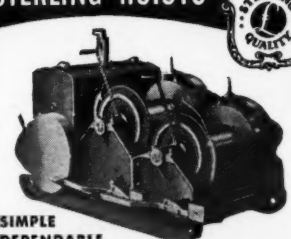


Gets on the Job Fast . . . Cleans it up Fast ANGLED OZER

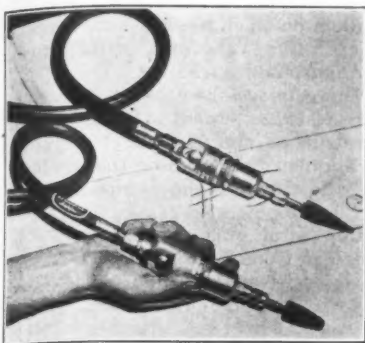
• Here's one of the handiest pieces of equipment you ever saw. It is a bulldozer *plus*. Besides the regular bulldozing position, it can be quickly and easily adjusted for six other angles. You always have exactly the right angle to do a particular job faster and better. And, Trojan's patented parallel lift mechanism always holds the blade steady—no flopping around. Mount a Trojan Angledozer on your Industrial Wheels. Make them do double duty. Easy to mount . . . easy to operate . . . low in costs. Let your International dealer give you all the angles on the ANGLED OZER, or write to Department CE-84.

CONTRACTORS MACHINERY CO., INC., BATAVIA, N.Y.

STERLING HOISTS



STERLING MACHINERY CORPORATION
405 Southwest Blvd., KANSAS CITY



Highflex air hose for small tools is lightweight, oil-proof, and kink-resistant. It will withstand air pressures up to 250 psi, and in the 1/4-inch size weighs 8.8 pounds per 100 feet.

Lightweight Hose Is Strong Yet Flexible

A lightweight air hose for use with small tools is announced by The B. F. Goodrich Co. of Akron, Ohio. Highflex hose in the 1/4-inch size weighs 8.8 pounds per 100 feet, with proportional weights for the other sizes. It is designed to withstand air pressures up to 250 psi.

The Highflex hose is said to be as flexible as lamp cord and to resist kinking; its light weight reduces operator fatigue. Because of its oil-proof construction, it will not swell to cut air pressure or volume, says Goodrich; nor will it flake off and cause tools to jam or choke with rubber particles. The hose braid is designed for strength at the angle of maximum stress, and the tube and braid for minimum expansion under pressure. Other features claimed are: that it will not tear or snag easily, the lighter weight will cause less abrasion, it will resist sun checking, and it takes up less storage space.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 41.

Convertible Excavator Described in Catalog

A catalog on the K-12 excavating machine has been prepared by Insley Mfg. Corp., 800 N. Olney St., Indianapolis 6, Ind. The K-12 can be used as a 1/2-cubic-yard shovel, trench hoe, clamshell, crane, or dragline.

Feature of the catalog is "the inside story" on the construction of the Insley. This shows, by means of sectional photographs and printed matter, the features of the machinery deck, the shovel boom, revolving frame, the crowd, the turntable, crawler frame, end tumbler, crawler shoes, bull gear, locking pawl, top idlers, tension adjustments, hoist and swing assemblies, hook-roller construction, and the crawler drives.

The catalog is full of photographs which show the Insley at the various types of work for which it is recommended. A special insert gives complete specifications and dimensions for the unit and its accessories. This insert also shows the unit's working-range dimensions for each type of service to which it can be adapted, and its load capaci-

ties in these same uses.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 52.

Powered Tail-Gate

A hydraulically powered tail-gate which can be used as its own loading platform is announced by Cemco Industries, Inc., of Galion, Ohio. The Hydraulic-Lift tail-gate has a rated capacity of 2,000 pounds, including a safety factor to guard against possible overload.

The operator controls the action of the tail-gate at all times through a special lever. According to the manufacturer, this lever permits him to raise, lower, and start or stop the load at any position between ground and truck-bed level. The Cemco unit weighs 733 pounds complete, and can be installed on any truck or semi-trailer body.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 55.

Data on Improved Tractors

A specification sheet on the improved Model D8 track-type tractor has been prepared by Caterpillar Tractor Co., Peoria 8, Ill. This tractor features a 130-hp drawbar pull, and a constant-mesh transmission which provides 5 forward speeds and 3 reverse.

The bulletin features a large photograph of the D8 and a complete list of specifications. These include the belt and drawbar horsepower, the drawbar pull in pounds, travel speeds in forward and reverse, features of the 4-cycle water-cooled diesel power unit, and the

starting method. Among the dimensions listed are those for gage (center to center of tracks), length of tracks, area of ground contact with standard track shoes, overall length, overall height and width, ground clearance, height of drawbar above the ground, and lateral movement of the drawbar. Other information covers the transmission, tank capacities, and weight.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 92.

Southern Mgr. for Jaeger

John A. Schultz has been named Regional Manager of southern sales and service activities of The Jaeger Machine Co. Mr. Schultz will make his headquarters at the company's southern regional offices at 235-38 American Life Bldg., Birmingham, Ala. E. L. Mosebaugh, District Representative, and M. B. Merts, Jr., Sales Engineer, also serve this territory from the Birmingham offices.

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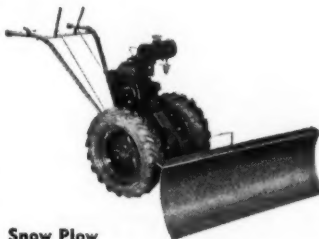
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Marvel Equipment Co.

224 S. Michigan Avenue

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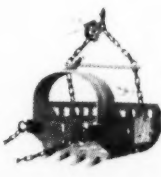
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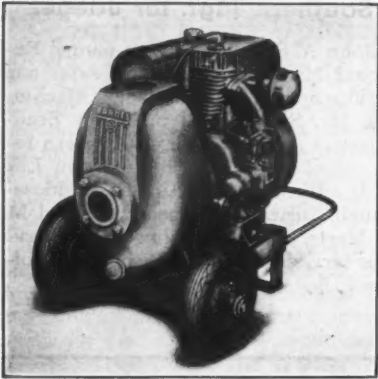
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NOW!



This is the 20,000-gph model of the new Barnes automatic centrifugal pumps, featuring high-speed, non-clogging priming.

Priming Is Feature Of Centrifugal Pump

A line of automatic centrifugal pumps which feature an exclusive method of high-speed, positive, and non-clogging priming is announced by the Barnes

Mfg. Co., Mansfield, Ohio. This priming is said to be achieved by a free-passage vent located adjacent to the periphery of the impeller. According to the manufacturer, this permits priming with as little as one-third normal water level in the pump body. Once primed, a pressure balance is established between the water in the priming chamber and impeller area. There is no recirculation during the pumping cycle.

Among the other features claimed for these pumps are the Barnes super-seal, direct-flow suction, special non-clogging track-type impellers, simplified impeller adjustment, and heavy-duty body. The present line includes pumps with capacities ranging from 3,000 to 90,000 gph.

Barnes also manufactures a line of universal-drive pumps with the same features. They are furnished without engines and have V-groove pulleys for operation from existing power sources. Or they may be directly coupled to either gasoline engines or electric motors.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 40.

Data on Hoists and Cranes

A line of electric hoists and cranes in a wide range of capacities and styles is made by Robbins & Myers, Inc., 1934 Clark Bldg., Springfield, Ohio. And literature describing the complete line is available on request. It gives infor-

mation on each of the styles in the line, listing capacities, specifications, and outstanding features.

The catalogs show internal views of the hoists and cranes to illustrate their construction and features of operation. In addition to tabulating specifications, they describe in detail component parts of the equipment.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 109.

M

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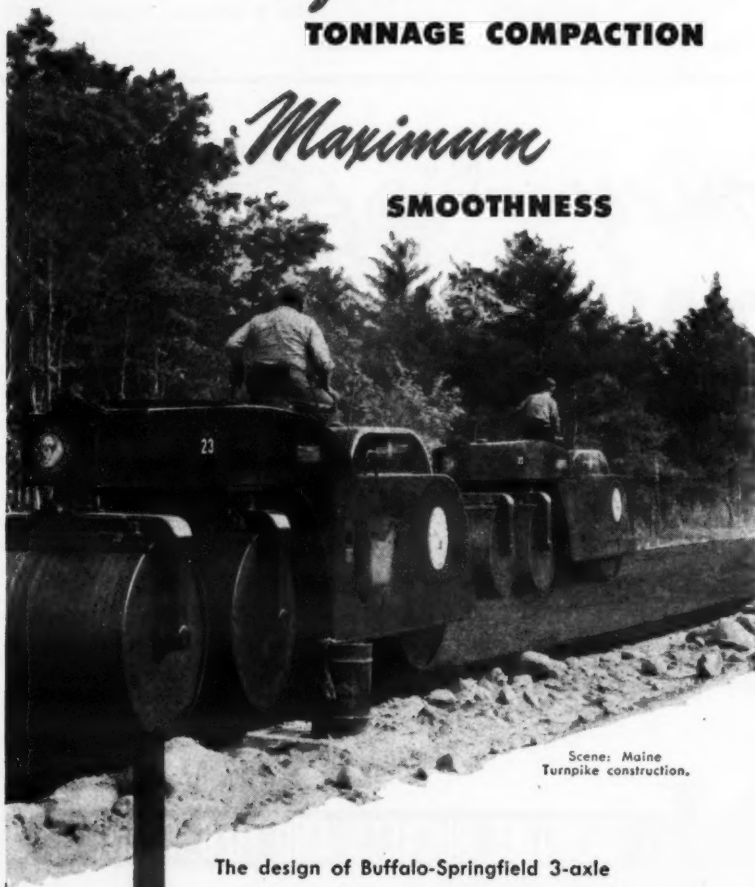
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Highest
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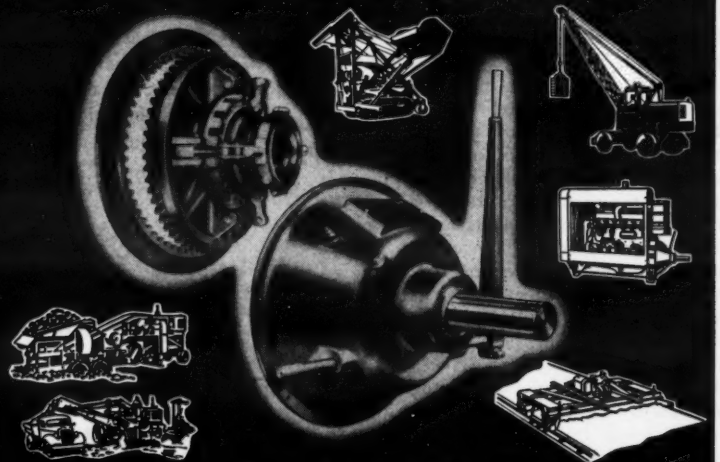


Scene: Maine Turnpike construction.

The design of Buffalo-Springfield 3-axle tandems means greater work capacity and smoother compacted surfaces. Official, unbiased records confirm one 3-axle tandem does the work of two conventional rollers, and the finished surfaces are more than 50% smoother than those compacted by 2-axle machines.

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* The clutches used in ROCKFORD POWER TAKE-OFFS are carefully balanced to prevent centrifugal force from affecting efficient operation. A special machine checks the balance of each clutch within extremely close limits, before it passes final inspection.

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Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.



ROCKFORD CLUTCH DIVISION

314 Catherine Street, Rockford, Illinois, U.S.A.

BORG-WARNER

New Span Replaces Old Covered Bridge

Latter Washed Out in 1936 Connecticut River Flood; Concrete for Substructure Delivered by Truck-Mixers

THE Massachusetts Department of Public Works is now building a modern concrete and steel bridge across the Connecticut River between Greenfield and Montague City in the western part of the Bay State. The new structure, designed for H-20 loading, is 766 feet 8 1/4 inches long, center to center of end bearings, with four spans supported on three piers and two abutments. Work on the bridge started last July, and is scheduled for completion by the end of this year. A contract for its construction was awarded to the J. F. Fitzgerald Construction Co. of Boston on its low bid of \$903,914.

Historically, this site on the Connecticut River has been bridged as far back as 1802, when the first bridge over the river in this vicinity was built under a charter granted by the Legislature in 1796. The charter specified that it should be a covered bridge, and that tolls should be collected to reimburse the proprietors for the cost of construction and maintenance. In 1832 the highway on both sides of the river became part of the public roads system, but the bridge remained in private hands.

River floods washed out this initial span, and also two subsequent bridges on the same site. A fourth bridge, constructed in 1859, was replaced ten years later by an early railroad company that now forms part of the Boston & Maine Railroad system. The Railroad built a double-deck covered wooden bridge, designed for highway traffic on the lower level and railroad traffic on the upper level. Originally the design was a series of wooden trusses, but in 1901 the bridge was strengthened by the addition of laminated wood arches to support the heavier trains. Railroad traffic was discontinued in 1921.

On March 18 in the great flood of 1936, this old covered bridge was washed out when the river rose from a normal elevation of 110 to elevation 149, or 10 feet above the top of the piers. The adjacent street railway bridge also went out at the same time. After the flood the State built another bridge about 2 1/2 miles up the river near Turners Falls. But residents of the Town of Montague on the east side of the river, and also in the Town of Greenfield on the west bank, pressed for a new bridge on the original site. Their agitation culminated successfully with the present construction.

New Bridge

The old field-stone piers of the former highway and street railway bridges have been removed from the river which will be crossed by a modern structure with a capacity for 20-ton trucks on its 26-foot roadway. The new bridge has two steel truss spans across the river, and a steel beam span on each approach. One steel through truss has a span of 238 feet, and the other is 398 feet. Consideration for suitable foundations made it necessary to choose unequal spans rather than the conventional equal-span bridge. The remainder of the total length is made up of nearly equal steel-stringer approach spans from the abutments out to piers 1 and 3. The numbering of the three piers is from west to east.

All the substructure is built of reinforced concrete, with a granite facing added to the upstream end of the piers as protection against winter ice. The west abutment is of the skeleton type, consisting of five columns spaced 17

feet apart. The columns are 3 feet wide and are supported on footings 2 to 4 feet deep. High up on the opposite bank the east abutment is more or less a bridge seat; it is 42 feet long x 6 feet wide with a cutout for the steel beams resting on a 5-foot depth of concrete. This structure is supported on 24 treated-timber piles.

Piers 1 and 2, together with the west abutment, are founded on solid ledge rock. The footing for pier 1 measures 65 feet 6 inches x 11 feet 6 1/2 inches, with a depth varying according to the contour of the rock but averaging 3 feet. The base of the pier stem or column is 12 inches in from the edges of the footing, and rises 28 feet above the footing to the top of the cap. The walls batter 1/2 inch to the foot so that

the pier is 7 feet 9 inches wide under the coping.

Pier 2 has a 77-foot 8 1/2-inch x 16-foot footing, 3 to 4 feet deep, above which the pier column goes up 46 feet; the width under the coping is 11 feet. Pier 3 is built into the steep eastern bank of the river just above the water, with its step footing supported on 90 steel bearing piles driven down to solid rock. The footing is 68 feet 6 inches x 20 feet, with the step risers measuring 2 feet 9 inches. The pier itself tapers in from a 10-foot width at the bottom to 7 feet 9 inches under the coping, and the top is 45 feet above the lowest point of the footing.

Low-Water Stage

Advantage was taken of the low-water stage during the 1947 mid-summer to work on pier 2 which is the only structure actually in the river. Over most of its width at this point the Connecticut is a shallow 2 or 3 feet in depth except near the east bank, or Montague City side, where deeper water is found.



C. & E. M. Photo

A Bannock truck-mixer on a Mack truck gets hot water for winter concreting from a 1,000-gallon tank set up on a timber platform. The water is heated by live steam from the boiler. Work on the Connecticut River Bridge continued through the 1947-1948 winter whenever the temperature rose to 50 degrees F.

The flow of the river is also regulated in this vicinity from a dam and powerhouse about a mile upstream.

A temporary road was built right out (Continued on next page)

EXTRA LONG PILING Driven Expertly

The Clark Street cross-over mezzanine station of the Dearborn Street subway required one of the deepest open-cut excavations in Chicago's history—61 feet. A huge cofferdam was necessary before excavating—built of 70-foot steel sheeting of heaviest section obtainable—the longest piles ever driven, top-to-bottom, in Chicago.

To drive this piling, the contractors selected two McKiernan-Terry Double-Acting Pile Hammers. For the first 50 feet of penetration, a 9B3, as shown in photo, delivering 8,750 foot-pound blows—an 11B3, with blows of 19,150 foot-pounds, for the final 20 feet. The straightness with which these long piles were set and driven aroused much favorable comment.

McKIERNAN-TERRY CORPORATION Manufacturing Engineers
19 Park Row, New York 7, N. Y.

For more than 50 years, engineers and contractors have been choosing McKiernan-Terry Pile Hammers for large or small projects because of their dependability, power and safe operation. The McKiernan-Terry line offers a choice of ten standard sizes in double-acting hammers; five single-acting hammers; two double-acting extractors—always a right hammer or extractor for any given job.

FREE DESCRIPTIVE BULLETINS

Write for McKiernan-Terry Bulletins No. 55 and No. 57 giving complete information and specifications on McKiernan-Terry Double-Acting and Single-Acting Pile Hammers. Keep these helpful guides handy for reference.

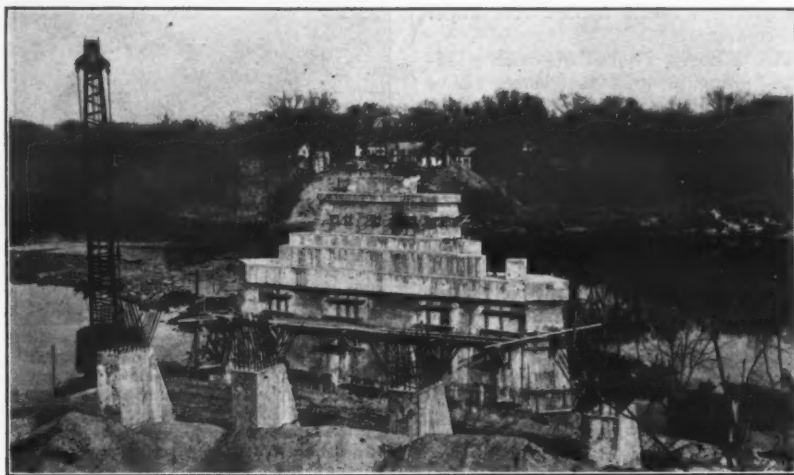
MK 251



Other McKiernan-Terry Activities

McKiernan-Terry quality and engineering excellence is also found in coal and ore bridges, bulk material unloaders, marine equipment and other large engineering structures performing important service to industry, railroads and our government.

McKiernan-Terry PILE HAMMERS AND EXTRACTORS



C. & E. M. Photo

You are looking at the Greenfield-Montague City Bridge from the west bank of the Connecticut. In the foreground is the skeleton-type abutment. The boom of a Link-Belt Speeder crane is visible at left.

New Span Replaces Old Covered Bridge

(Continued from preceding page)

in the river from the west abutment to reach pier 2. Rock, gravel, and dirt were available along the bank for this purpose, and the roadway was built wide enough to accommodate trucks and heavy equipment. A sandbag cofferdam, 8 to 10 bags high, was thrown up by hand around the footing site, and the 200-cubic-yard footing was poured without incident late in August.

Concreting followed on the footing for pier 1. And by the end of October piers 1 and 2 were completed, together with the west abutment up to the bottom of the haunches. Along with the work on the new structures, seven old stone masonry piers from the former bridges were removed from the river. It was felt that their continued presence would mar the natural appearance of the location, and also cause dangerous eddies in the vicinity of the new bridge.

An attempt was made to batter these piers down with a heavy ball weight swung from a crane, but progress was slow, so they were blasted apart with dynamite. Some of the old stone was suitable for riprap, but what could not be used was disposed of by dumping into deep holes in the river.

Forms and Concrete

Forms for the footings were made of common boards of varied sizes, but 5/8-inch plywood was used for the rest of the structures. The panels were backed up by 2 x 4 studs on 12-inch centers, and supported with double 2 x 6 wales on 2 1/2-foot centers. Richmond ties on 2 1/2-foot centers both ways held the forms together.

Truck-mixed concrete was purchased from the Northfield Washed Sand & Gravel Co. of Northfield, Mass. To reduce the hauling distance from the plant to the job, which is about 10 miles, a reloading bin for the aggregate was set up only 2 miles from the river bank. Bag cement was also added at this point. To reach the west bank for the pours on pier 3 and west abutment, a 6 1/2-mile haul was necessary, the river being crossed on the bridge at Turners Falls. As many as 8 truck-mixers were used to deliver the concrete for the largest pour on the job—the footing for pier 3, a continuous pour of 376 cubic yards. But the usual number in service was only 3. Ransome, Rex, and Smith truck-mixers of 4 1/2-yard capacity were in service on this job.

Water was added to the batch from a standpipe located near the aggregate bin. The batches were mixed 1 1/4 minutes for each yard of concrete in the mixing drum, or a minimum total mixing time of 5 minutes. The mixers turned 90 revolutions per minute. Lone Star cement was used in the mix, together with washed sand and gravel. Class A concrete, with 5.96 bags of cement to the cubic yard, was used

in the abutments, while Class B concrete, at 5.32 bags to the yard, went into the pier pours. The bulk of the job

consisted of Class B concrete.

The Mix

Class B concrete was mixed in the proportions 1 : 2.2 : 4.1, and a typical batch of 4 1/2 yards weighed as follows:

Cement	500 lbs.
Sand	1,210 lbs.
Gravel	2,060 lbs.
Water	34-37 gals.

The sand and gravel conformed to the following gradations:

Sieve Size	Per Cent Passing	
	Gravel	Sand
1 1/2-inch	95-100	....
3/4-inch	35-65	....
3/8-inch	10-25	100
No. 4	0-5	95-100
No. 16	....	55-80
No. 50	....	10-25
No. 100	....	0-8

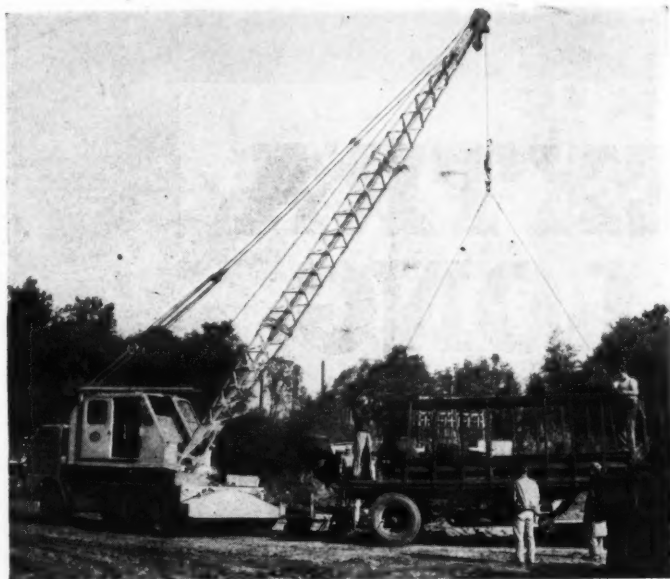
Equipment and Materials

As on most bridge jobs, cranes played an important part in the construction. On this project the contractor used two, both with 70-foot booms—a Koehring on the Montague City side and a Link-Belt Speeder on the opposite or

Greenfield bank. They did the excavating with 1 1/4-yard clamshell buckets, and also placed the concrete in the higher pours by means of Blaw-Knox 1-yard bottom-dump concrete buckets which were filled from the truck-mixers. The mix was discharged into hoppers placed on top of the forms with elephant-trunk pipe leading down to the bottom. On the lower pours the truck-mixers either chuted the concrete directly into the forms, or used a combination of chutes, hoppers, and elephant-trunk pipe. As the concrete was placed, it was vibrated with Master vibrators.

From a quarry on the west side of the river, additional stone for the riprap was taken as needed. The rock was drilled and blasted, then loaded on flat-bed trucks by a Koehring truck crane. Two 315-cfm air compressors powered the jackhammers which were used both in the quarry and on the ledge-rock foundation portions of the substructure. A half dozen pumps, from 2 to 6-inch

(Continued on next page)

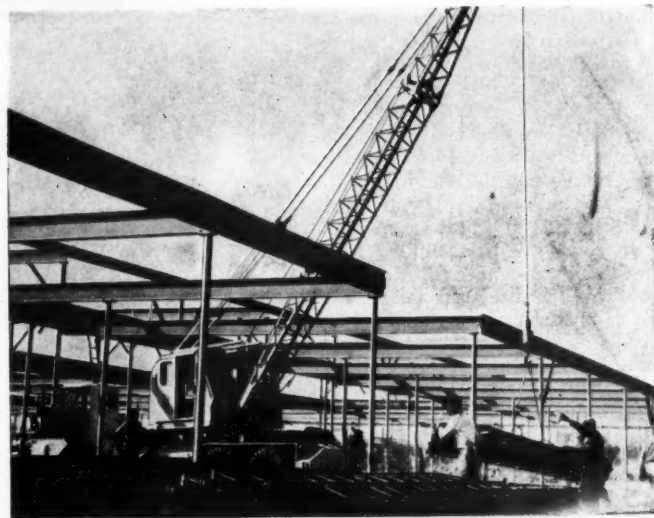


F. H. McGRAW COMPANY'S MICHIGAN TRUCK CRANE Keeps Crews Busy, Prevents Delays...

This single morning's work is typical of Michigan. Although smallest of the cranes owned by F. H. McGraw Company, Inc., this Michigan 12-ton Truck Crane has worked on a wide variety of industrial construction jobs from Connecticut to

Four Jobs... ONE MORNING

- ① Erect roof trusses
- ② Unload cast-iron pipe
- ③ Set structural steel
- ④ Place prefab sheathing for roofing crew

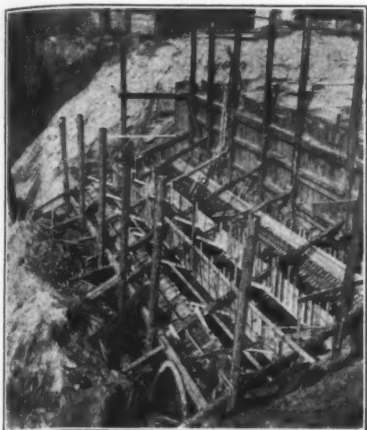


Illinois. To the complete satisfaction of its owner, it has proved an outstanding time-saver... For your jobs, too, get the mobility, speed and dependable, economical performance of Michigan Mobile Shovel-Cranes. Send for full details.

MICHIGAN

MICHIGAN POWER SHOVEL COMPANY

490 MILLER STREET • BENTON HARBOR, MICHIGAN, U. S. A.



C. & E. M. Photo

This is the form work for the pier 3 footing of the new Connecticut River Bridge. It is ready to take the job's largest concrete pour—376 cubic yards.

sizes, were on hand for unwatering the cofferdams and footing forms before a pour. An Allis-Chalmers tractor-dozzer helped build the construction road leading out in the river.

Reinforcing steel was supplied by Joseph T. Ryerson & Son, Inc., from Cambridge, Mass., and the granite nosing for the piers came from the H. E. Fletcher Co. of West Chelmsford, Mass. Materials were shipped by rail to the Boston & Maine RR siding at Turners Falls on the east side of the river, and hauled from there to the job site in trucks. Part of the reinforcing steel was trucked all the way from Boston, about 100 miles.

Pier 3 Footing

As previously mentioned, the largest single pour on the job was 376 cubic yards of concrete for the step footing at pier 3. While this was done in a single day, Monday, November 24, with the help of some overtime of course, work in preparation for the pour started as far back as September. An old sanitary sewer that was in the way of the new pier had to be relocated, and after that the site on the steep east bank of the river was excavated to grade. Concurrently with the excavation, sheeting was driven on all four sides to keep the sidehill in place and out of the hole.

On the river side and along both ends of the structure, 16-foot steel sheet piling was driven by a McKiernan-Terry No. 7 hammer handled by the Koehring crane with the 70-foot boom. A vertical 110-hp coal-burning boiler up on the bank supplied the necessary steam. The steel, which was furnished by the Carnegie-Illinois Steel Corp., was driven on the line of the structure to serve as a form for the concrete. It was left in place as further protection for the pier against wash and erosion in time of flood. The sheeting goes down 8 feet below the bottom of footing.

Against the land side of the structure, 3 x 12 tongue-and-groove wooden sheeting was driven to hold the bank in place, and braced with 12 x 12 rangers on 4-foot vertical centers. Timber piles, 36 feet long, were then driven inside the 12 x 12's on 15-foot centers by a McKiernan-Terry No. 9B2 hammer. Outside the steel sheeting other 12 x 12's were hung, and timber piles were driven alongside them both on the river and end sides, also on 15-foot centers. Timber piles were likewise strung on a slope line to brace the structure still further, reaching from the back row of piles to the front row. From these piles were hung the wooden forms for the step footing.

Excavation proceeded safely within this sturdily built cofferdam. When it was completed, a checkerboard template made of 3 x 8's was laid across the top, supported on the timber piles. This horizontal floor served as a work platform and guide for driving the steel H-beam piles on which pier 3 is founded. Altogether 90 piles, 14-inch

89-pound section, supplied by Carnegie-Illinois, were driven with a maximum load of 55 tons per pile. Driving was done by a Vulcan 50C hammer moving in 18-foot wooden leads. Of varying length, the piles were spaced an average of 3 feet on centers both ways. They were cut off with an oxy-acetylene torch so that they projected 2 feet 9 inches into the concrete footing. Steel plates on bearing were then spot-welded to the tops of the piles.

A wooden form wall of 3/4-inch boards was next constructed at the back or land side of the footing, about 4 feet in from the wooden sheeting, and backed with 2 x 4 studs on 14-inch centers. Other forms for the steps were hung from the timber-pile bracing, the steel was set in place, and the pour was made. With this wide structure, two truck-mixers could discharge their contents at the same time from the high bank down into the forms.

The only other pile work on the job was the driving of treated-timber piling

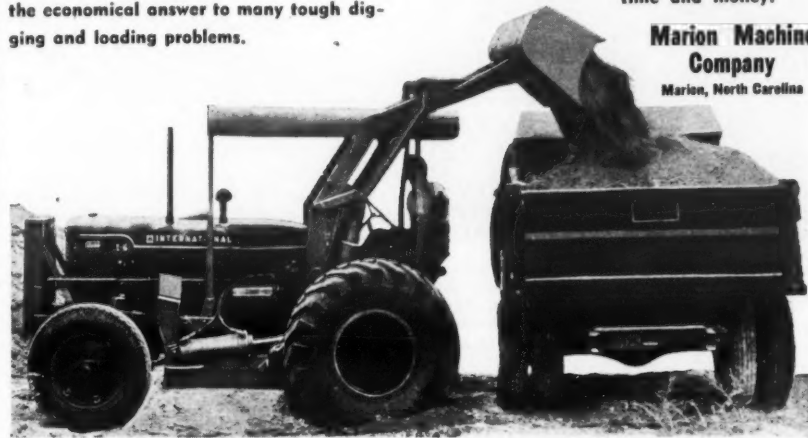
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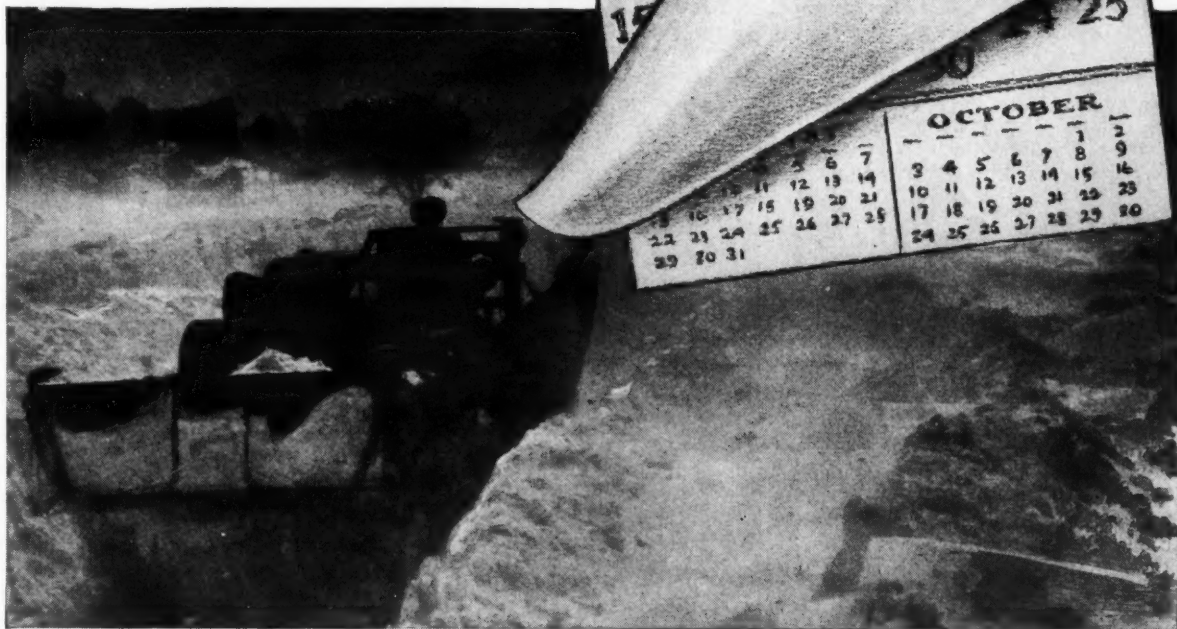
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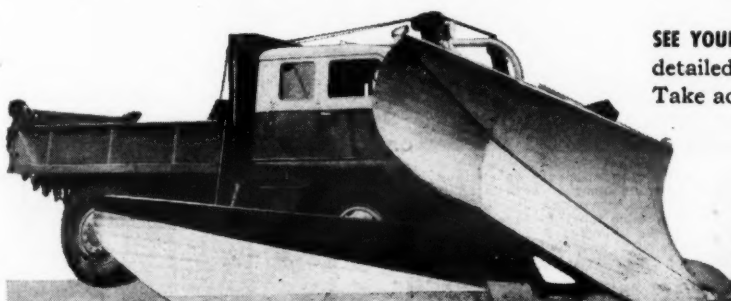
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SNOW FIGHTERS



C. & E. M. Photo
A Rex truck-mixer on an Autocar dumps a load of concrete into pier 3 forms of the Greenfield-Montague Bridge via a chute, hopper, elephant-trunk connecting pipe, and still another chute.

New Span Replaces Old Covered Bridge

(Continued from preceding page)

for the east-abutment foundation. They were supplied by Koppers, Inc.

Winter Concrete

Work on the bridge continued through the 1947-48 winter whenever the temperature rose to 50 degrees F, permitting concrete to be placed. At first only the water in the mix was heated, but as the weather grew colder the aggregate at the plant was also warmed. During these winter pours the water was not added until the truck-mixers reached the job site. A 1,000-gallon tank for water was set up on a timber platform, high enough to discharge by gravity directly into the truck-mixers as they reached the bridge with their loads.

An enclosure was built around the 110-hp boiler to keep cold air off the boiler shell. The housing consisted of boards covered with roofing paper with a door in front for the operator and fireman. Water for the tank was tapped off the city fire hydrant by means of a reducer and a 3/4-inch line. From the boiler a 1 1/2-inch live-steam line opened into the water tank, heating the water to around 120 degrees F. As this was drawn off into the truck-mixers, the tank was refilled in 20 minutes.

During the warm weather, water was used for curing the concrete, but in the

winter live steam both cured and warmed the mix. Tarpaulins were draped over the forms enclosing 1 or 2-inch live-steam lines which were equipped with valves at 6 or 8-foot intervals. They threw a fog of steam around within the enclosure, keeping the concrete warm until it had set up.

Superstructure

This year the Phoenix Bridge Co. of Phoenix, Pa., will erect the steel superstructure under a subcontract. The bridge is on a 62-degree skew, and will have a maximum floor-slab elevation of 158.7. Spans 1 and 4, running respectively from the west and east abutments to piers 1 and 3, consist of steel stringers. Span 1 has two 36-inch WF 194-pound beams and nine 36-inch WF 150-pound beams, while span 4 has seven 36-inch WF 150-pound beams. The 238-foot span 2 has 35-foot-deep trusses, 35 feet apart, while 50-foot-deep trusses make up the long 398-foot span 3.

The 26-foot roadway has a 6 1/2-inch

concrete deck to be topped by membrane waterproofing and a 2 1/4-inch course of bituminous concrete. On the downstream side will be a 5 1/2-foot sidewalk, and on both sides, 3 1/4-foot concrete rails.

Quantities and Personnel

The major items on the bridge contract include the following:

Unclassified excavation	2,400 cu. yds.
Steel sheeting	40,000 lbs.
Treated-timber piles	750 lin. ft.
Class A concrete	925 cu. yds.
Class B concrete	2,620 cu. yds.
Granite for piers	1,800 sq. ft.
Steel reinforcement	260,000 lbs.
Structural steel	3,250,000 lbs.
Riprap	2,100 cu. yds.
Steel piles	6,750 lin. ft.

The J. F. Fitzgerald Construction Co. has employed on the job a force of from 26 to 45 men under the direction of Jake Newell, Superintendent, and Charles Alger, Assistant Superintendent.

For the Massachusetts Department of Public Works, L. D. Parker is Resident Engineer, assisted by B. R. Lanciault, H. L. Rithner, and Ralph H. Lincoln.

Philip H. Kitfield is Chief Engineer of the Department, and Ralph O. Spofford is Bridge Engineer. The project is located in District 2 which is headed by Cyril B. Raymond, District Engineer.

Jig-Saw Attachment

A jig-saw attachment for standard drill presses is manufactured by the LaMonte Mfg. Co., 9746 Ramona St., Bellflower, Calif. It uses standard jig-saw blades and will find many uses in sign-making shops, maintenance shops, and other places.

The jig-saw attachment is installed by gripping the power unit in the drill chuck, and fastening the worktable to the drill-press bed with C-clamps. All moving parts are packed in grease and are hermetically sealed. The LaMonte jig saw will cut in any direction as the blade can be mounted in all four positions. It has no belts or pulleys.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 70.

New

UNIT 1520

Self-Propelled RUBBER-TIRED CRANE

15 TON CAPACITY

This 50,000 pound Mobile Crane is a completely new member of the UNIT Crane and Shovel line. Designed for both "on and off" highway operation. So compact, it works efficiently even in small, cramped quarters, "in or out" of the yard.

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REMOVABLE BUMPERS

Both the UNIT 1520 and 357 Mobile Crane are equipped with removable bumpers.

UNIT 357 MOBILE CRANE

WITH SHOVEL ATTACHMENT
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Greater digging efficiency is attained in excavating by removal of one bumper. Permits additional space to lower boom, thus increasing digging depth in trenching or other excavating jobs. Provides close-range operation on shovel work. Bumper is bolted to undercarriage frame and its removal is a simple operation.

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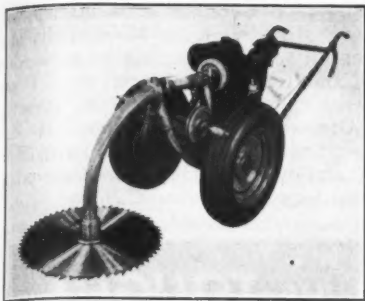
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A MODEL TO FIT EVERY JOB!

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5-ton 4 & 24 to 1	110 lb.	\$ 85.00
15-ton 4, 18 & 109 to 1	680 lb.	\$350.00

Positive internal brake. Free spooling. Most practical portable hand power unit on the market today.

"IN THIS RUGGED STRENGTH LIES SAFETY"



The new Jaques power saw is self-propelled and requires only a guiding action by the operator. Its 30-inch circular blade can be used either horizontally or vertically.

Self-Propelled Saw

A self-propelled power saw is announced by the Jaques Power Saw Co., P.O. Box 695, Denison, Texas. It is designed for use in all land-clearing and light timber-cutting operations. Feature of the new Jaques saw is that it requires no pushing or pulling—just a guiding action, the manufacturer explains.

The saw has a 30-inch circular blade which can be used horizontally for felling trees or clearing brush, and vertically for cutting and trimming logs to length. It is powered by a 6-hp gasoline engine, and is mounted on a two-wheel carriage.

As a special feature, Jaques announces that the self-propelling unit can be installed on all models presently in use. A kit for converting these saws is now available.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 26.

Weed-Killing Liquid

A weed-killing compound of the 2, 4-D type is produced by the Ralston Purina Co., 835 S. 8th St., St. Louis, Mo. It is supplied in a liquid form which is emulsifiable and which, when mixed with water, can be applied by spraying. The manufacturer states that it will not stop up nozzles, nor cause uneven distribution during spraying. It can also be supplied in a powder form for spreading as a dust.

This killer is produced in two types: one contains 20 per cent of the 2, 4-D compounds; while the other contains 44 per cent Pura-ester, an isopropyl ester containing a 37 per cent 2, 4-D equivalent.

In explaining the action of these Purina killers, the company points out that they are of the plant-hormone type; they speed up and cause malfunctioning of normal growth processes. This brings about a violent reaction in the plant and finally its death, normally in a period of from 1 to 2 weeks. For best results, the material is spread in accordance with an established sequence as recommended by the manufacturer.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 30.

Line of Hoisting Machinery

A line of hoisting machinery is described in a catalog now available from the Superior-Lidgerwood-Mundy Corp. of Superior, Wis. This 19-page catalog describes hoists in many capacities, designed for many types of service. They can be powered by gasoline or diesel engines, steam generators, or electric motors, to suit the preference of the user.

Bulletin H-414 contains a list of general specifications concerning the drums, brakes, winch head, gearing, shafts, duty ratings, frictions, ratchet and pawl, hoist frames, etc. It lists the various series of hoists and gives complete specifications for each model in the line.

Specialty items covered in this bulletin include gasoline drag-scraper hoists,

hoists equipped with torque converters, capstans and car pullers, boom-swinging gears, cable-laying hoists, bridge-rotating engines, haulage and slope hoists, dredge hoists, stone grapples, dredge-deck engines, and others.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 53.

Pile-Driving Hammers

Pile-driving hammers are the subject of a circular available from the McKiernan-Terry Corp., Dept. D, 15 Park Row, New York 7, N. Y. Circular No. 2 is a 4-page folder listing in concise form the specifications of the entire line of McKiernan-Terry pile hammers and extractors. A feature of the folder is job photographs showing McKiernan-Terry hammers at work on bridge, pier, and trestle projects, driving a variety of types of piling.

Among the items listed in Circular No. 2 are 10 sizes of double-acting hammers, 5 single-acting hammers, and 2

double-acting extractors. The folder lists the complete specifications, capacities, and recommended uses of each of these units.

these units.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 56.



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The Dorsey Low Bed Trailers have the lowest possible center of gravity and are equipped with the safest braking system, larger models being hydraulically operated through master cylinder actuated either by air or vacuum.

Here is a series of real Low Beds, with minimum platform height and including, as Standard Equipment, rear loading ledge, air or vacuum brake equipment, lights and reflectors and tool box.

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Model MK 10-15 Tons

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MODERN Designed TRANSPORTATION



This new round-type concrete bucket, made by the Muller Machinery Co., is of heavy steel-plate construction, welded throughout.

New Concrete Bucket Has 1-Yard Capacity

A 1-cubic-yard concrete bucket is announced by Muller Machinery Co., Inc., Metuchen, N. J. This round-type bucket is designed for crane elevation jobs with high walls or where forms cover a wide area.

It is made of heavy steel plate, welded throughout, with steel bar reinforcement around the top and bottom. The discharge opening is 14 inches square and is closed by a double-acting steel-plate gate, designed to stand up in hard service and to prevent the leakage of grout. The gate is operated by a curved-pipe handle. A reinforced eye permits suspension on a crane hook. The bucket is 63 inches high and 55 inches in diameter.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 38.

Wire Rope Coated With Solid Plastic

A Nylon-coated wire rope is produced by Rochester Ropes, Inc., Culpeper, Va. Wirelon will be available in diameters ranging from 1/32 to 1 inch, or greater. It is recommended by the manufacturer for use as automotive brake and speedometer cable, for earth-moving machinery, and for other uses. The Du Pont Nylon coating is said to be unaffected by oils, cleansing agents, marine growths, and all alkalis. It is not harmed by such acids as nitric, hydrochloric, or sulphuric in concentrations up to approximately 1 per cent. It is also said to be stable under a wide range of temperatures, and to retain its flexibility whether wet or dry.

The Wirelon is made in three styles: Nylon extruded onto single strands of wire; plastic applied to the outside of wire ropes which are already formed; and wire rope made from individual strands coated with Nylon and then woven into the finished product.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 127.

Saw, File, Tool Manual

A 64-page booklet containing information on saws, files, and other tools has been made available by Henry Disston & Sons, Inc., 574 Tacony, Philadelphia 35, Pa. This new edition of the Disston manual contains a brief resumé of the history of the corporation, and tells how to choose and use saws of all types; how to sharpen them; how to choose and use files and hand tools; and how to care properly for saws, tools and files.

Many items made by the company are listed, and photographs point out the principal features of each. The book also lists the sizes in which each tool is made, and suggests uses for which each is suited. The booklet is indexed for easy location of the data.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 88.

Air or Water-Cooled Electric Generators

New diesel-electric plants in both air and water-cooled models have been announced by D. W. Onan & Sons, Inc., 43 Royalston N., Minneapolis, Minn. The 2,500-watt Model 205DSP is powered by the new Onan Model DSP air-cooled diesel engine. The Onan water-cooled plants are powered by heavy-duty Buda diesel engines.

The Model 205DSP features voltage regulation without the use of rheostats or other external equipment, all controls located on the steel base, and rubber shock-mounting. It is supplied in models producing 60-cycle 2,500-watt current in voltages of 115 or 230, single-phase; 115 or 230-volt single-phase 3-wire; or 230-volt three-phase 3-wire. Standard accessories include two heavy-duty 6-volt starting batteries connected in series, an oil filter, oil-bath air cleaner, muffler, two flexible fuel lines, hand crank, and an extra fuel-injection pump, holder, and nozzle. Also included are battery cables, battery hydrometer, and remote start-stop station.

Features claimed for the water-cooled models include voltage regulation without the need for separate regulators, a circuit breaker, oil-pressure cut-off switch, over-temperature cut-off switch, built-in engine and electric instrument panels, and running-time meters on the ac models. The water-cooled ac units range from 10 to 35 kw. Styles include single and three-phase in all standard voltages, in 50 or 60-cycle. The dc units have the same kw range, and are available in 115 and 230-volt models.

Further information may be secured

from the company, or by using the enclosed Request Card. Circle No. 12.

Caterpillar Staff Changes

R. V. Bradley has been named a member of the Sales Development Division of the Caterpillar Tractor Co. He will hold the position of special engine

sales representative. J. M. Abbey will serve distributors in Minneapolis and central Canada, and will be succeeded in the New Mexico and west Texas territory by C. D. Ashby. J. K. Tibbetta, a District Representative since 1944, has resigned to accept a position with Held & McCoy Machinery Co., Caterpillar distributor at Denver, Colo.

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The rims are worn out, but the splined hub can be re-rimmed many times.

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Bull Shoals Project. Its Plan and Design

(Continued from page 2)

rated at 1,650 tons per day of refrigeration capacity.

Ice wouldn't work. Not on this job. Ice in the right proportion to meet the water-cement ratio would produce only 72-degree concrete.

The job will see rates of placing up to 400 cubic yards an hour, with great hammerhead cranes handling the buckets. It will see massive prefabricated cantilever steel forms, now being delivered by Blaw-Knox, and the use of the newest type of absorptive form lining.

It will see a grade of concrete embodying everything Man now knows about the subject: concrete designed to hold back a turbulent river and to stand a thousand years.

History of the Dam

The White River Valley in the vicinity of Bull Shoals has long been recognized as a desirable location for a dam. In 1910 Congress approved an application of the Dixie Power Co. for construction of a dam about 10 miles below the present site, but a presidential veto voided the action. In 1919 this company again obtained a construction permit but could not finance the project. Later the White River Power Co. took over the project, but was discouraged by the results of foundation tests and abandoned it.

In a report submitted to Congress in 1931, the Wild Cat Shoals site, a few miles downstream from Bull Shoals, was included in a group of eight reservoirs. They were selected as the most effective of thirteen investigated. In a report submitted in 1937, the Chief of Army Engineers presented a comprehensive flood-control plan for the Ohio and lower Mississippi Rivers which included recommendation for six reservoirs in the White River Basin. And in 1938, Congress authorized \$25,000,000 for initiation and partial accomplishment of this program of construction.

A report published in 1940 presented the Bull Shoals site as an alternate for the Wild Cat Shoals site, where foundation conditions were found to be unfavorable, and indicated that Bull Shoals Reservoir was economically justified for the combined purposes of flood control and the production of hydroelectric power. In 1941, Congress then modified the White River Comprehensive Plan to include Bull Shoals, and authorized the expenditure of \$24,000,000 for the prosecution of the plan. Subsequently, in 1944 and 1946, additional appropriations were voted for the Comprehensive Plan which when added to previous authorizations total \$134,000,000.

The Dam—Description and Use

The reservoir is for flood control and power. The upper portion for the first 41 feet of its depth will be used specifically for the regulation of floods arising on the upper White River. The remaining storage in the reservoir is provided for the development of hydroelectric power, with incidental benefits to recreation and wild-life resulting from the formation of a lake 87 miles

long, holding 5,408,000 acre-feet at full capacity, and covering a maximum surface area of 71,240 acres.

During flood periods water will be stored to prevent, so far as possible, flood stages that would damage property downstream from the dam. The storage reserved exclusively for flood regulation is equivalent to an average of over 7 inches of depth of water over the entire drainage area upstream from the dam.

Water will be stored in the flood-control pool an average of about 20 days a year, although it will be used for much longer periods some years, and in other years not at all. Except during large floods and prolonged dry periods, the lake levels resulting from regulation of stream flow will be favorable for boating and fishing.

The south end of the dam axis is situated near the summit of a vertical stone bluff 300 feet above the White River. Looking north from the bluff across the river, one sees a panorama
(Continued on next page)



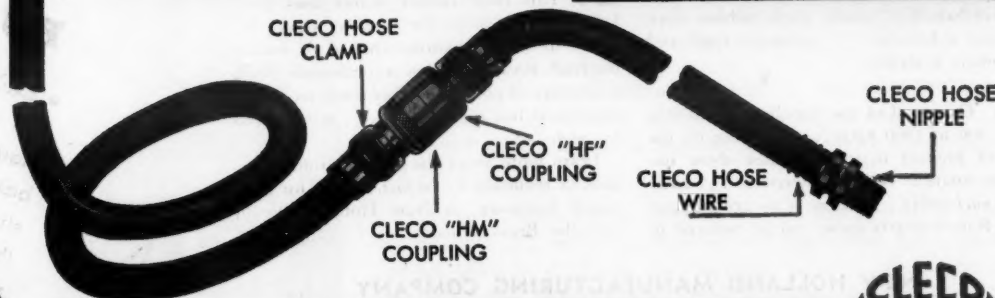
You're looking at an impromptu "sandbag factory" set up at Troutdale, Oreg., to keep back floodwaters of the Columbia River from the \$19,000,000 Reynolds aluminum plant. Sand was loaded into the skips of two Mixermobiles, put through the mixer drum and into the hopper. Burlap bags were filled with the sand right out of the hopper and transported to dikes at the aluminum plant by five Scoopmobiles. This set-up turned out 240,000 sandbags a day—and helped save the valuable aluminum plant.



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Bull Shoals Project, Its Plan and Design

(Continued from preceding page)

of rounded hills and woodlands curving far downward to a stream of water rippling over a reef of rocks. This reef is known as Bull Shoals, across which the dam will extend.

The office of the U. S. Engineers is on top of this bluff. Excavation for a highway to give access to the top of the dam marks the line of the dam. The highway connects with Arkansas State Route 5 about 6½ miles west from Mountain Home. This road was built by Ottinger Brothers of Oklahoma City.

A railroad to connect with the Missouri Pacific lines at Cotter, Ark., was built to the job by William A. Smith Construction Co. of Houston, Texas.

The powerhouse, as it will ultimately be built, will extend along the dam 450 feet and will contain eight turbines and generators, each with a capacity of 70,000 hp. Each generator will have a

rated capacity of 42,000 kilowatts. The initial installation, consisting of three power-generating units, will produce about 575,000,000 kilowatt-hours of power in a year of average stream flow.

The spillway will extend more than 800 feet from the end of the ultimate powerhouse towards the north side of the valley. It will consist of 17 bays separated by piers. Set in each bay on the spillway crest, 217 feet above the riverbed, will be a radial or taintor gate. Sixteen conduits will be provided through the lower spillway section of the dam. The spillway and conduits will be used to regulate the level of the flood-control pool. The concrete stilling basin extending downstream from the toe of the spillway about 200 feet, full width of the spillway, is designed to dissipate the enormous energy created when water roars downstream at that point at a speed of 87 miles per hour.

The maximum base width of the dam at the spillway section will be 230 feet. The top of the dam, 41 feet above the

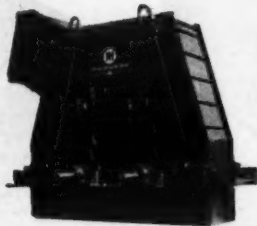
spillway crest, will provide a 22-foot roadway between parked vehicles except at the spillway. The roadway across the spillway will be divided into two 13-foot lanes separated by an island 8 feet wide. The natural beauty of lands surrounding the lake will be preserved so far as possible to encourage the use of the lake for recreation. The dam itself will be a mass-con-

crete gravity-type structure. It will be 2,256 feet long at the top, and rise approximately 280 feet above bedrock.

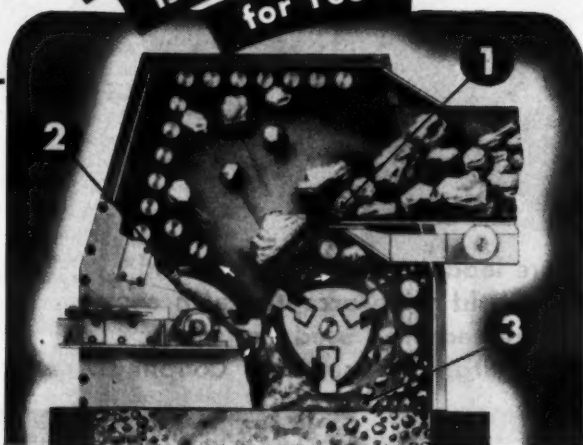
Eight penstocks, 18 feet in diameter with 19 x 26-foot gates, are to be installed. Through these penstocks will flow the water that actuates the big 13-foot-diameter turbine wheels.

In the five years it is estimated to (Continued on next page)

MORE THAN 6,000 Smashing Blows A Minute!



Here's Why
Reduction by Impact
Is more Profitable
for You!



1. Rock fed into the New Holland Breaker receives its first impact from one of the impeller bars while still in mid-air. Pieces are hurled with smashing force . . . upward and outward . . . to crash against other rocks and breaker bars of 5" steel. Each rushing piece becomes a hammer . . . reducing itself and the others it strikes.

2. The speed of the impellers is variable from 300 to 1000 r.p.m.'s, depending on the size of product desired. Because these impellers rotate in opposite directions . . . away from each other . . . there is no grinding action. Run-of-quarry stone can be reduced to

80%—1" in one breaker pass, without excessive fines. Reduction is accomplished solely by the dynamic action of impact in mid-air.

3. This Dual Impact Action uses every last ounce of energy for breaking stone. No power is wasted fighting choked or packed material. Breaking action is continuous. These economies of power and time mean more production at less cost per ton . . . more profits for you.

Learn more about the greater profit potentials of reduction by impact. Write for illustrated literature on New Holland Double Impeller Breakers today.

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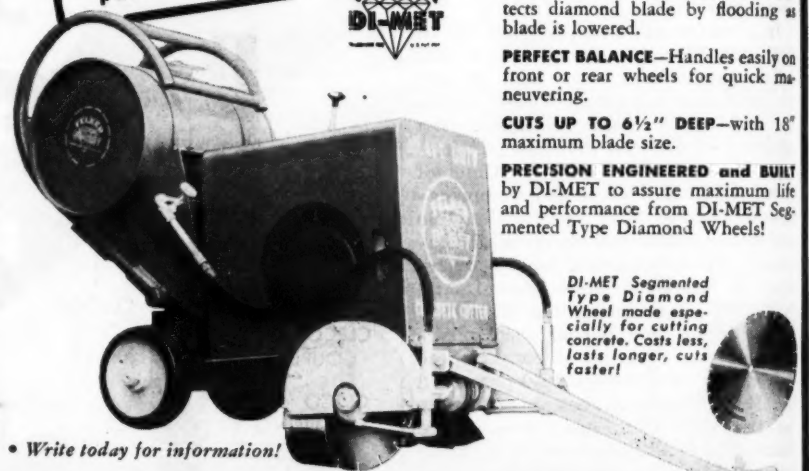
MOUNTVILLE, PA., U. S. A.

NEW HOLLAND
DOUBLE IMPELLER Breakers



ADVANTAGES:

- Straight, true edges when trenching concrete.
- 40-50% less breaking-out time.
- 60% overall saving in labor and materials.
- Cleaner, neater, longer-lasting patches.



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BULLETIN

complete the mighty dam, it is expected that 1,500 men will work 2,750,000 man-days. They will produce, mix, and place 2,100,000 cubic yards of mass concrete. They will place 6,200,000 pounds of steel reinforcement, and 10,300,000 pounds of other embedded and structural metal. It will take 1,800,000 barrels of cement to make the concrete.

Organizing the Job

Organizing the job was a brilliant feat in itself. The talent necessary to guide a 1,500-man crew had to be gathered together. The only equipment readily available to do a job of this size had already been seen plenty of service at Friant and Dale Hollow Dams. Every piece of this big equipment—mixing plant, gantry cranes, locomotives, cement cars, big power shovels—had to be overhauled or rebuilt before it went to work.

Fortunately there was no camp problem. Labor for Bull Shoals is generally available locally. Only three 20 x 48 Quonset hut dormitories had to be built for the men who wanted to stay on the job.

But other things had to be put up fast. One of the first was a modern 6-bed hospital, staffed by a resident physician and three registered nurses. There the employees get a physical examination before they report for work. There are emergency surgery provisions, and ambulance service. The safety director, employed by the insurance carrier for the job, makes his office there.

Any man reporting for work at Bull Shoals Dam, either to Ozark Dam Constructors or Flippin Materials Co., gets a typewritten sheet of safety instructions as soon as his physical examination is complete. These instructions tell him, if he does not already know:

1. All injuries occurring on the job must be reported to your foreman and to the first-aid station or hospital. If 8 hours or more are lost due to an injury, you must get a release from the first-aid station or hospital before returning to work.

2. If you are off because of an off-the-job injury or illness, notify your foreman, superintendent, or the time office.

3. Safety goggles, spectacles, or face shields must be worn when grinding, drilling, chipping, welding, or when doing any work where flying or splashing material might injure the eyes.

4. Never direct compressed air towards your own or another person's body.

5. Never ride on cranes, engines, trucks, lifts, or movable equipment without proper authority. Do not operate any machinery or vehicles without your foreman's permission.

6. Every employee must wear a hard hat while on duty.

7. Drink water from drinking fountains or authorized containers only. Do not use bottles, buckets, or other containers.

8. Keep a clean house. Do not strew materials around your working area.

9. Make sure of the condition of scaffolds or ladders before mounting them.

10. All gasoline must be handled in red, approved safety cans. Do not use open buckets or ordinary containers. Gasoline must not be used as a cleaning solvent without the express permission of your foreman.

11. Never use a hand tool with a mushroomed head or cracked handle. It is mandatory that you take care of tools assigned to you, and that you use the proper tool for the job.

12. Drinking intoxicants on the job or coming to work under the influence of intoxicants will be cause for immediate discharge.

Safety shoes are also available to the men on the job, and may be purchased at the cafeteria.

Other facilities, too, had to be erected. A used airplane hangar was set up for

a shop. An addition to this hangar created the administrative headquarters suitable for a job of this size. A concession was granted for the establishment of a cafeteria and restaurant at the dam.

Tremendous aggregate-cooling facilities, crushing and screening equipment, had to be designed and materials procured. Foundations had to be prepared on the right abutment. When they are completed, the concrete will have to be hauled only a short distance to the hammerhead cranes. A big compressor building will be built and an evaporating spray pond to serve the cooling-plant condensers.

A service bridge was built across the river below the dam to carry the railroad and the access highway.

Two principal problems soon began to show. The first was how to cool the aggregate for controlled-temperature concrete. And second, how to transport the raw material 7 miles from the quarry to the job. **CONTRACTORS AND**

(Concluded on next page)



SLASH cleaning costs!

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can help you lower
equipment servicing costs.

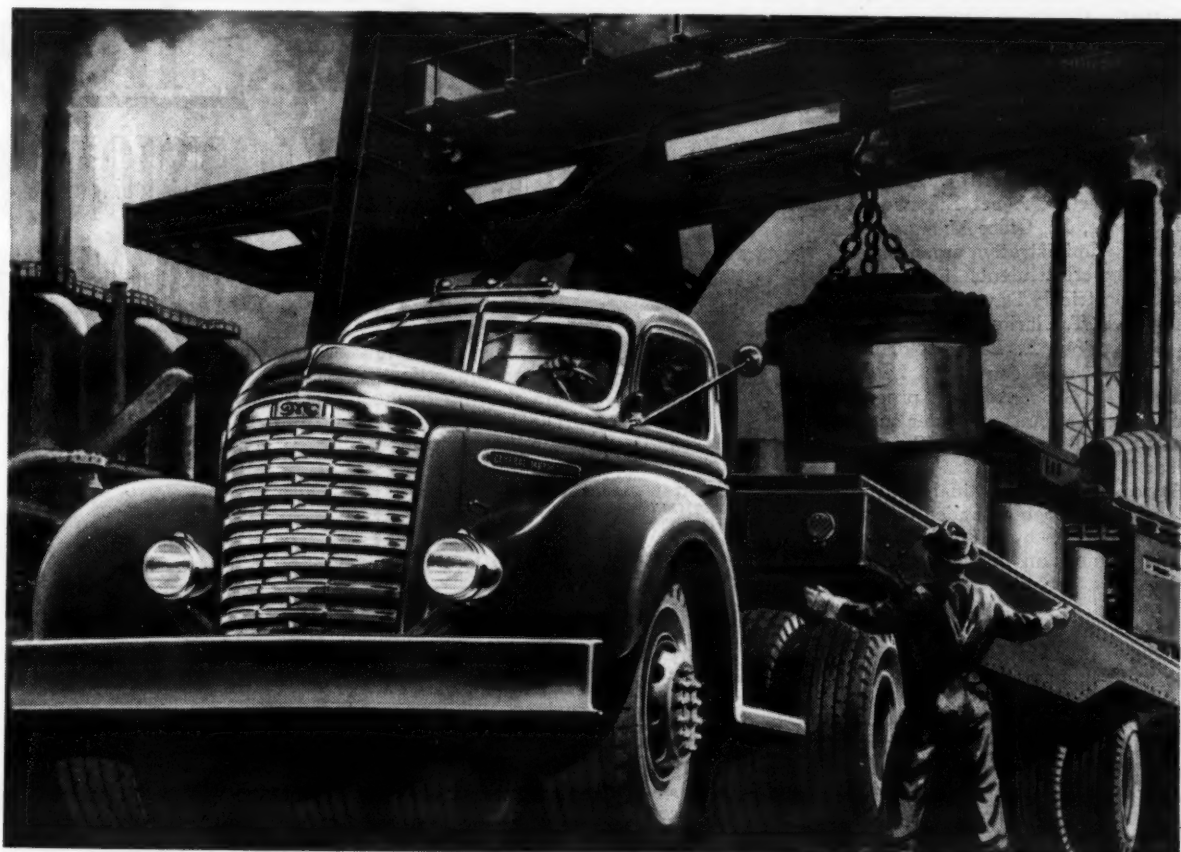
36 pages of money-saving service shop cleaning procedures you will want to know about! Time-saving ways to steam-clean motors and chassis . . . recondition clogged radiators . . . clean cooling systems . . . degrease parts before repair. And many other improved job-cleaning procedures. Write NOW for your FREE copy. No obligation.

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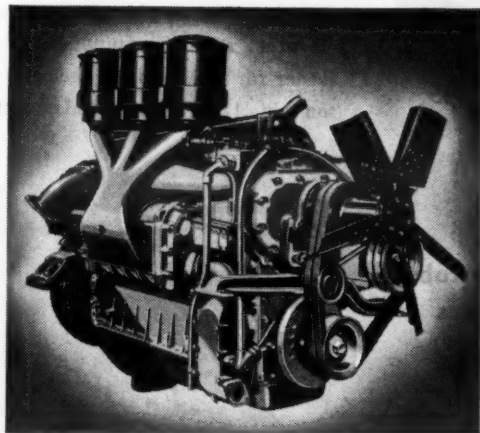
Specialized Industrial Cleaning



BUILT TO "TAKE IT"

... GASOLINE OR DIESEL

Illustration is drawn from actual photograph showing "850" series GMC hauling 40 tons of rolled steel between plants of a large steel mill.



GMC heavy duty engines are available in six sizes . . . 308, 361, 426 and 477 cubic inch gasoline engines of famous GMC "Army Workhorse" design . . . four- and six-cylinder GM 2-cycle Diesels of 133 and 200 horsepower respectively. Illustrated is the "6-71" Diesel.

GMC heavy duty trucks are built in weight ratings that go up as high as 90,000 pounds for truck, trailer and load. That's a lot of weight, and it calls for big powerful engines . . . heavy, husky axles . . . and deep, thick frames, plus rugged strength and sturdiness in every other structural part.

GMCs are designed and engineered by men who are expertly versed in heavy hauling applications, gasoline and Diesel. They are produced in factories devoted exclusively to the production of commercial vehicles.

That's why GMC heavy duty trucks are the choice of so many of the nation's most experienced and successful heavy haulers. Make them first choice for your job, too . . . from the many gasoline and Diesel models now available for quick delivery.

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GMC TRUCKS

Tune in Henry J. Taylor, "Your Land and Mine," Mutual Network, Monday and Friday.

THE TRUCK OF VALUE

GASOLINE • DIESEL

Bull Shoals Project, Its Plan and Design

(Continued from preceding page)

ENGINEERS MONTHLY will describe the solution to the first problem in another article in the future. How a conveyor system was built through hilly country is detailed in an article on page 82.

Organizing a job of this magnitude presented thousands of details, hundreds of minor and major decisions, and dozens of problems once considered impossible of solution. Bull Shoals Dam is being directed by men who work months ahead of themselves to make the decisions as easy as possible. The details of this and companion articles are the result of those decisions.

Personnel

The dam is being administered under the general supervision of Colonel G. E. Galloway, CE, District Engineer, with W. W. Ralph as Chief of his Construction Division. Ralph E. Johnson is the Engineer in Charge, with Roy F. House and Lincoln Sherman as his assistants. George L. Otterson is Chief Inspector and W. L. Burgess is the Concrete Technician.

Ozark Dam Constructors as well as Flippin Materials Co. is being sponsored by Brown & Root Co., Herman Brown, President, representing the co-adventurers. Ross White, Project Manager; H. H. Roberts, Project Engineer; and J. D. Moore, Jr., Office Manager, complete the administrative organization.

Key superintendents include Guy Smith, electrical; Dave Williams, mechanical; B. T. Clarke, rigging; R. Norris, excavation; E. Earnest, drill and grout; T. Davis, conveyor; H. Vine, quarry; P. Schoenberger, processing plant; and J. Milam, carpenter superintendent. William Fraser is Safety Engineer.

Approximately 950 tin-hatted stiffos on the job are being handed occasional pieces of advice by a tough-mannered kindly Californian in faded khaki. In at least a dozen high places, this man is regarded as the greatest living dam builder in the country. He is the Project Superintendent, and his name is Harvey Slocum.

Magnetic Sweepers

Magnetic sweepers for use in highway department and contractors' yards where nails and other iron particles present a hazard are made by the Columbia Engineering Service Co., 593 Market St., San Francisco 5, Calif. Built in the style of a lawn mower, they are manufactured with 12 to 72-inch sweeping widths.

A series of Cesco permanent Alnico magnets are mounted on an alloy-steel axle. One end of a canvas cover fastens to the retainer pan—the other end passing over the assembly and under the magnets. It is held in place by a small steel rod. This rod is said to hold the canvas over the magnet faces while in operation by means of magnetic attraction. The ferrous materials are attracted to the magnets as the sweeper is rolled along.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 80.

Heavy-Duty Trailers

A 4-page folder describing several of its heavy-duty machinery trailers is being distributed by The Winter-Weiss Co., 2201 Blake St., Denver 2, Colo. These include 20 to 60-ton low-bed trailers, 20 to 40-ton low-bed semi-trailers with single and tandem axles, and 20 to 40-ton full trailers with tandem bogie axles.

The folder points out the principal features of each of these trailers, the various specifications covering it, and recommended uses. Several component

parts are discussed in detail, including the oscillating axles, railroad-type coil springs, wheels and bearings, goose-neck, full-trailer conversion units, brakes, frame, and optional equipment.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 48.

First Aid for Burns

An ointment for the first-aid treatment of burns is prepared by The Pac-Kit Co., P. O. Box 1306, Greenwich, Conn. It is recommended by the company for the treatment of burns resulting from fires, electrical or welding equipment, scalds, friction, and sun and wind. It is described as an emollient dressing which contains linseed oil, lanolin, white petrolatum, and calcium oleate with chlorbutanol as a preservative and analgesic.

The Pac-Kit Co. also manufactures a complete line of first-aid kits to meet various emergency needs. These come

in four standard sizes. The No. 750 kit is designed for use in automobiles, trucks, and small shops. The No. 752 is for use by small groups of from 8 to 15 persons. The No. 753 is for public buildings and groups of from 12 to 25 persons.

sons. And the No. 754 is a large unit for groups ranging from 20 to 50 workers. P-K also prepares unit-type refills.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 50.

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HEAVY DUTY MOTOR TRUCKS

Since 1907

Chain drive

All wheel drive

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Four wheel

Gasoline

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SEALTIGHT

PREFORMED EXPANSION JOINT FILLERS AND OTHER ASPHALT PRODUCTS

Expansion joints, using a preformed filler of bituminous content and a means of load transmission between the adjoining slabs, have, over a period of years, proven their high value in prolonging the life of the structure and reducing maintenance costs.

A SEALTIGHT expansion joint filler is available to meet any standard specification requiring a bituminous preformed filler.

SEALTIGHT Preformed Bituminous ASPHALT Expansion Joint consists of 75 to 80% pure blown asphalt held together in a tough, shock-resistant mass with a fibre binder. Two layers of saturated felt paper give added strength and rigidity for handling purposes.

SEALTIGHT Preformed Bituminous FIBRE Expansion Joint, a resilient non-extruding type of joint, consists of a fibrous board uniformly impregnated with an asphaltic compound which thoroughly waterproofs the fibres but does not affect the natural resiliency of the board.



Other Products include:

For blacktop surfacing and maintenance: cutback asphalts, paving asphalts and road oils in tank car lots; emulsified asphalts in tank cars or drums.

For concrete construction and maintenance: Asphalt crack fillers and joint fillers (drums) including Fed. Spec. SS-F-336.

Also sewer joint compounds, asphalts for waterproofing, and preformed asphalt closure strips for corrugated sheeting.

**Manufactured By
W. R. MEADOWS
INC.**

ELGIN, ILLINOIS

CUMMER ASPHALT PLANTS

**COMPLETE PLANTS
FROM 60 TO 100 TONS
PER HOUR
FURNISHED AS
ILLUSTRATED**

**Other Smaller Plants Portable
Mounted on Pneumatics**

**PROMPT SHIPMENT
ON ALL SIZES
FEEDERS—STORAGE BINS—
PUMPS—TIMERS
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Literature Upon Request

CUMMER TWO-FIRE DRYER and 40-TON BIN UNIT

PHOTO BELOW SHOWS TYPICAL INSTALLATION

60 tons per hour capacity—located at Fall River, Mass.

Completely equipped with dust collection unit discharging into boot of hot elevator. Plant is equipped with 3-compartment cold storage hopper and feeder for regulation of feed into the dryer. 4' x 10' vibrating screen, 40-ton bin, 1-ton mixer, dial scales complete with all motors and drives.

Boiler house contains boilers, all asphalt pumps, etc.

Plant owned by the Sherry Corporation, Fall River, Mass.

**THE F. D. CUMMER & SON
COMPANY
BUILDER OF FINE ASPHALT
PLANTS
EAST 17th & EUCLID, CLEVELAND 15, O.**

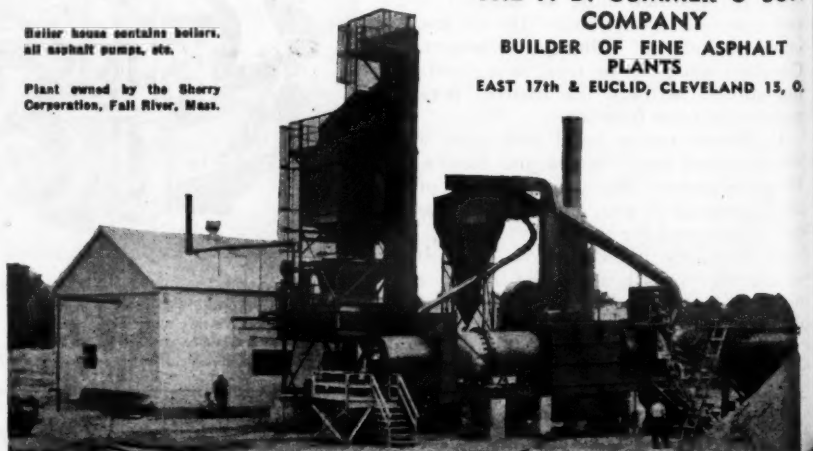




Photo by Menasco

A power winch operates a block and tackle system which draws forward the rear carriage of the Winch-Lift dump trailer; then pivot arms automatically raise the trailer body to the dumping position. Special feature of the unit is its ability to pull itself out of the mud.

Trailer Pulls Itself Out of Mud and Mire

A winch-operated dump trailer was among the new types of equipment demonstrated at the ARBA 1948 Road Show. It is made by Winch-Lift, Inc., 317 First National Bank Bldg., Shreveport, La., and according to the manufacturer, the trailer will unload at any angle up to the full jack-knife position, enabling it to be used for spot or sump dumping. It employs a block and tackle system operated by a power winch which draws the rear carriage forward. This forward motion is converted to a lifting action by the pivot arms which are designed to raise the trailer body automatically to the dumping position.

A special feature claimed by Winch-Lift is that the trailer can pull itself or the prime mover out of mud holes and other spots when one set of wheels is stuck, without the need for tractors or other extra equipment. To do this, the trailer is raised to a three-quarter position, drawing the rear wheels of the trailer forward. The trailer brakes are then set and a chock is placed under the rear wheels. Lowering the trailer forces the bogged truck wheels out and into the clear. The reverse of this system is used if the trailer wheels become bogged.

The Winch-Lift trailer is made in four standard sizes—6 to 8, 8 to 10, 10 to 12, and 20 cubic yards. Special sizes are custom-built. The winch is powered by the truck engine through the transmission with a power take-off. A standard upright-mounted winch with a 12,000-pound pull and a 1:1 power take-off is usually used. The 8-yard model is equipped with electric brakes; air-vacuum or electric brakes are optional on the larger models. Tires and axle sizes match the capacity of the trailer.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 78.

Insulating Roof Tile Described in Catalog

An 8-page catalog on the physical properties and features of Kaylo insulating roof tiles has been put out by the American Structural Products Co., Toledo, Ohio—a subsidiary of the Owens-Illinois Glass Co. Kaylo roof tile is designed to combine fire resistance, structural strength, and insulation in a lightweight roof-deck material. Its dead-load weight above the main purlins is listed at 12 pounds, or less, per square foot.

The first section of the booklet describes the tile in general terms, listing its various features and pointing out how these are secured. It also tells the size in which it is made, and the way the material can be handled. The second section consists of a 2-page spread explaining specifications, design data, materials and method of installation, and other technical details. The last section provides figures on the results of tests conducted on the tiles.

These include tests for insulating value, strength, fire resistance, weight, dimensional stability and strength when wet, light reflectivity, and nail-holding power.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 64.

Blaw-Knox Acquires Foote

The Blaw-Knox Co. has entered into an agreement to acquire, through an exchange of stock, The Foote Co., Inc., of Nunda, N. Y. The principal products of The Foote Co. are concrete-paving mixers, black-top paving machines, and mixers for asphalt road maintenance. These will supplement without duplication the Blaw-Knox line of bins and batchers, truck-mixers, finishers, spreaders, subgraders, steel forms, clamshell and concrete buckets, and other items.

Blaw-Knox, in making the announcement, states that "One of the principal objectives in the purchase is to broaden

Blaw-Knox's participation in the construction field with machinery for bituminous-type paving". The acquisition will also strengthen the marketing position of Blaw-Knox and Foote distributors, giving them a larger opportunity for sales and service to the construction industry. It is planned to operate The Foote Co. under its present management as a wholly owned subsidiary.

Joins LaPlant-Choate

C. W. (Bill) Scholvin has joined the LaPlant-Choate Mfg. Co., Inc., of Cedar Rapids, Iowa. He will serve as District Representative in New York, Pennsylvania, Maine, Maryland, New Hampshire, Connecticut, and the eastern part of Canada. Mr. Scholvin formerly was the LeTourneau representative for the middle Atlantic states.

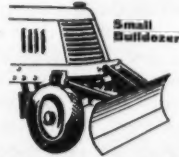
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POWER HYDRAULIC CONTROL



Lifts equipment ten times faster than hand pump. Easy installation on new or existing equipment. Hundreds of applications, such as Snow Plows, Sweepers, Power Mowers, etc. Priced for the most conservative budget.

WRITE FOR CIRCULAR H-78

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MONARCH ROAD MACHINERY COMPANY, 327-329 Front Ave., N.W., Grand Rapids 4, Michigan

Cut TRACTOR COSTS 1/2

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**HYDRAULIC FRONT-END
LOADER**

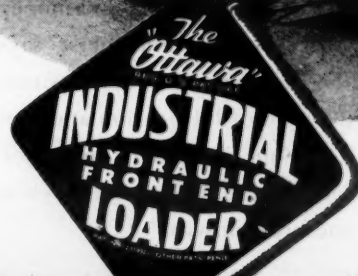
Get Twice as Much Out of The Tractors You Now Own

Ottawa Industrial Hydraulic Front End Loaders are available for light as well as heavy model industrial tractors. Every Ottawa Loader has been designed for maximum efficiency on the tractor with which it is used. Ottawa engineers have worked closely with leading tractor manufacturers in developing loaders for specific tractors—Loaders that meet these manufacturers' specifications for capacity efficiency and sturdiness.

Ottawa Industrial Loaders and their attachments are enabling State and County Highway Departments as well as other industrial tractor owners to cut operation costs over 1/2 on both light and heavy tractors. Keep your tractors working all year 'round. Put them to work on these jobs when they would normally be idle.

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Consult your industrial tractor dealer. If he can't supply you have him write or write direct for full information and price list.



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INDUSTRIAL DIVISION
OTTAWA, KANSAS • U.S.A.

Vibratory Compactor For All Types of Soil

A vibratory soil compactor is manufactured by the Vibro-Plus Corp., 243 W. 55th St., New York 19, N. Y. It is of the sled type and can be used as a self-propelling or tractor-drawn unit. It is powered by a 16-hp diesel engine and weighs about 3,100 pounds. The base plate has an area of approximately 10.4 square feet.

According to the manufacturer, the Type MRJ-5 Vibro-Plus compactor will obtain a compaction of 95 per cent to a depth of 4 feet in only two passes. This percentage is the usual minimum required by most highway departments. The depth of consolidation depends, of course, upon the type of soil material and its moisture. The company states that on a test conducted on a fill consisting of fine to medium-sized sand and having a moisture of only 5 per cent, a sufficient compaction was obtained to a depth of 6½ feet with one pass of the compactor.



The sled-type Vibro-Plus vibratory soil compactor is reported to obtain a 95 per cent compaction to a depth of 4 feet in two passes. It can be used as a self-propelling or tractor-drawn unit.

The unit is said to reach a maximum degree of compaction of 98.9 per cent at between 1 and 1½ feet. In general, maximum compaction is reached in three passes, with the degree in two passes only slightly lower. When used as a self-propelling unit, the unit has a speed of from 20 to 35 fpm.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 90.

Diesel-Engine Magazine

"The Dependable Diesel" has entered its fourth year of publication. This magazine, containing complete and up-to-the-minute news for diesel users, is published monthly by Cummins Engine Co., Inc., Diesel Drive, Columbus, Ind. The current issue runs to 24 pages and features more than 40 pictures of Cummins diesels being used in a wide range of applications.

The magazine contains articles on the use of Cummins power in the construction of Merriman Dam, Lackawack, N. Y.; in transportation difficulties such as those involved in delivering the new 200-inch "eye" to the Mount Palomar Observatory; in gravel-plant applications; etc.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 8.

LE-HI



LE-HI Series 150-B — The Universal Type Hose Coupling with the patented "Safety-Locking" feature that positively prevents accidental uncoupling. Especially designed for compressed air service. For ½", ¾" and 1" hose.

HOSE COUPLINGS



LE-HI Series 200-G or W — "Light Type" Air Hammer Hose Couplings. For lighter rock drills, jack hammers, sinkers, tampers, etc. Fast, easy coupling and uncoupling. Fully interchangeable. For ½" and ¾" hose. Available in ground joint and washer types.

ARE TOUGH

LE-HI Series 350-G or W — Heavy Duty Air Hammer Hose Couplings. Designed for the toughest kind of jobs. For heavy jack hammers, rock drills, and sinkers; also drifters, stoppers, wagon drills, etc. Maximum air flow. Leak-proof seal. For ¾" and 1" hose. Ground joint and washer types available.



LE-HI MAKES A GOOD CONNECTION!

Go to your local distributor for these rugged, economical LE-HI Hose Couplings — NEVER SOLD DIRECT.



HOSE ACCESSORIES CO.

2732 N. 17th Street
Philadelphia 32, Pa.

"We save time with

Gulf Quality Products

and keep our maintenance costs low"

says Superintendent
L. D. Brinson



Rubin Construction Co., West Palm Beach, Fla., has the contract to resurface 4 miles of U. S. Highway #1 in Palm Beach County, Fla. Gulf Quality products which are helping this contractor get fine performance from equipment include Good Gulf Gasoline, Dieselect Fuel Oil, Gulfpride Motor Oil, Gulfube H. D. Motor Oil, Gulflex Chassis Lubricants, and Gulflex Wheel Bearing Grease.

"WE figure we save a lot of time and money by using Gulf lubricants and fuels," says Superintendent L. D. Brinson of Rubin Construction Co. "We get the kind of lubrication and fuel performance that keeps our equipment on the job and operating smoothly—that helps us steer clear of excessive wear and breakdowns."

The use of quality petroleum products is one of the surest guarantees of efficient job operation and lower maintenance costs for equipment—which add up to greater profits! That's why so many

leading contractors engaged in all types of construction work specify Gulf lubricants and motor fuels. They deliver an extra margin of performance!

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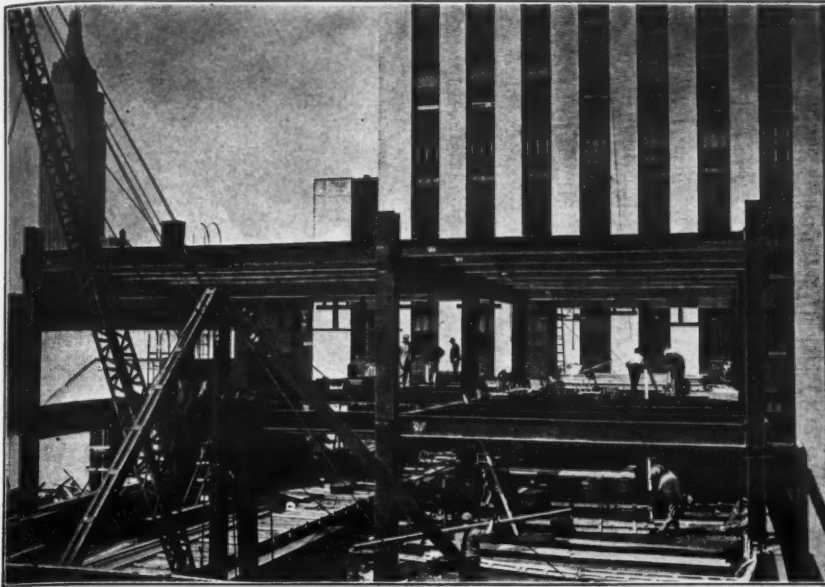


Buying Used Equipment?

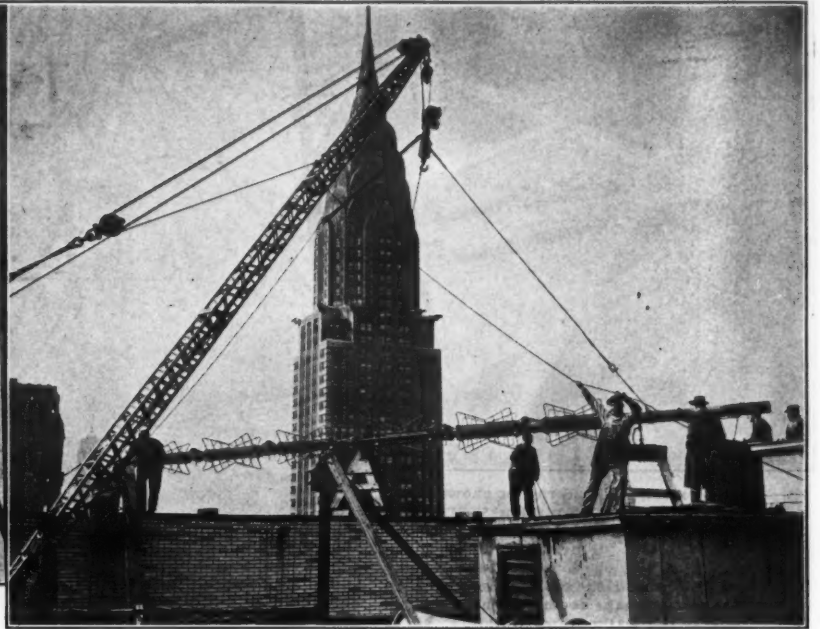
Read the
"TRADING POST"
See pages 98-99

Selling Used Equipment?

Advertise it in the
"TRADING POST"
See pages 98-99



Above, Turner nears completion on steel framework to house the new Daily News television studio in New York City. At right, workers raise the antenna 36 stories to the roof.



Television Station Built on 37th Floor

Working 36 Stories Up, Contractor Erects Tower, Builds 8 Rooms; Also Adds 2 Floors to 9-Story Plant

TURNER Construction Co. of New York City recently built the fourth television station in that city, Daily News Station WPIX. It erected a television tower 287 feet high on the Daily News Building, 36 stories above street level; added eight rooms above the 36th floor to house the television transmitter equipment; and built a 10th and 11th floor for studio space on top of a 9-story plant structure on the east side of the building. The company had 4 months for the work. Architects and engineers for the project were Alexander D. Crosett & Associates.

Material-Handling Problem

Sixty-five tons of steel were hoisted 36 stories up the face of the existing building to build the 37th-floor addition and the television tower. All materials for the construction work on the 37th floor had to be raised 467 feet from street level, and the service elevator

(Continued on next page)

Shunk Superior Quality BLADES AND CUTTING EDGES

For any make of machine
Motor Graders, Main-
tenance, Scrapers, Dredges,
Buildings, Backfillers,
Wagon Scrapers, Trail
Builders, Trail Blasters,
Carryalls, Also—

CUTTING EDGES
WEARING BOOTS
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EXTENSION BLADES
HOLD-BOARDS
and
SCARIFIER TEETH

50 years of manufactur-
ing blades has developed
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milled through our own
rolls and forged at the
edges to give that extra
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All widths lengths,
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READY TO FIT YOUR MACHINE.**

Consult your internation-
ally recognized Blade Spe-
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operate—get set for blades
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SHOWING HOW THE—

Moto-Paver Cuts Costs

ON VARIOUS TYPES OF
RESURFACING JOBS



Contractors who bought the first year's output of Moto-Pavers did so largely upon our recommendation, backed by our 80 years' experience in building asphalt mixing equipment. Today you can buy a Moto-Paver on its own performance record—on various types of work—under all kinds of working conditions and with various types of aggregate and bituminous materials. From the reports of Moto-Paver owners in many different sections of the country we have compiled a typical cost table which shows remarkably low total mixing and laying costs per ton. We shall be glad to send you a copy of this report on request.

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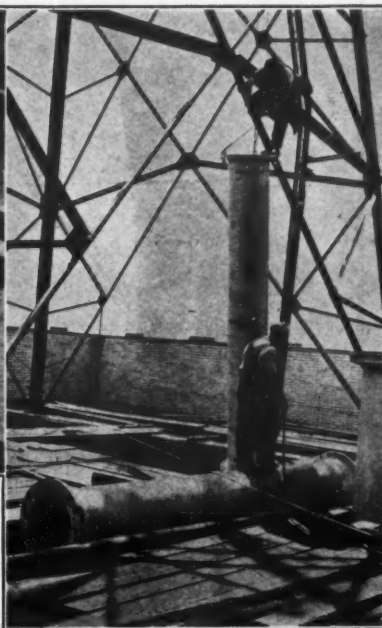
H&B Moto-Paver
THE COMPLETE TRAVELING MIXER AND PAVER



The Moto-Paver is a very flexible and versatile machine. The aggregate may be dumped directly from trucks into the front hopper, as shown here, or it may be picked up from a windrow, using an H. & B. Moto-Loader.



The layers of steel, felt, and rubber shown above isolate the studio floor of station WPIX from the concrete beneath to make it vibration and soundproof. The first picture at right shows the pylon being hoisted on top of the television tower, and the second shows workmen shortening knee braces to make room for the 37th-floor roof at the Daily News Building.



Television Station Built on 37th Floor

(Continued from preceding page)

could be used only for material not more than 10 feet long.

A small derrick with a 40-foot boom was brought up in pieces in the service elevator and assembled on the roof. With this, the larger hoisting equipment, a stiffleg derrick with a boom length of 60 feet, was raised from the street. The second derrick was used to hoist the structural steel from a private right-of-way west of the News Building to the roof of the 36th floor.

The largest single piece of steel raised by this method was a 36-inch I-beam weighing 2½ tons, used in the base of the tower. The other materials, including 150 cubic yards of concrete, were brought up in the service elevator.

Addition on 37th Floor

The construction on the 37th floor provides eight rooms, which include a transmitting room with a ceiling 4 feet higher than the remaining area, a console room, locker and washrooms, and two stairways. The new 37th-floor area is 58 x 80 feet.

Because of the unusual construction of the 36th floor of the News Building,

(Concluded on next page)



1 swing OR 10,000...

**Heavy Loads or Light
..the Upper Body of an
OSGOOD
Stays Stable and
in Alignment**

No detail is overlooked to make an OSGOOD give you more work for longer periods, with greater efficiency and at lower cost.

For example, every turn of the upper body, regardless of load, is smooth and stabilized. In addition to the conical rollers which travel on the rotating gear, every large OSGOOD is equipped with hook rollers which roll under the rotating gear. These hook rollers, adjustable to compensate for

wear, help distribute stresses evenly, keep the upper body firm and in alignment at all times.

This is only one example of the "perfection in detail" which makes OSGOOD Power Shovels, with famous Air Control, leaders for performance in their field.

POWER SHOVELS • CRANES • DRAGLINES • CLAMSHELLS • BACKHOES • PILE DRIVERS

THE OSGOOD CO. O-G THE GENERAL CO.
EXCAVATOR

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DIESEL, GASOLINE OR ELECTRIC POWERED • ¾ TO 2½ CU. YD. • CRAWLERS & MOBILCRANES



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Lancaster, S. C.	Syracuse, N. Y.

CONTINENTAL
RUBBER WORKS
TRIP, PENNSYLVANIA, U.S.A.

which carries a meteorological station, the Turner Construction Co. built a ceiling but no exterior walls for the 37th-story addition. A 3-story wall surrounding the meteorological equipment already existed above the 36th floor.

Steel beams, extending between the existing outside walls of the building, were put 10 feet above the roof of the new floor, to carry the television tower. To support the added weight of the tower, it was found necessary to reinforce columns of the original building on the 36th and 34th floors.

The Tower

The television tower itself consists of four sections. The base is 35 x 58 feet square and 10 feet high. The tower itself is 207½ feet high, tapering from 30 feet square at the bottom to 5 feet square at the top. The pylon is in three sections, two above and one below the tower level. It extends nearly 28 feet above the tower and is 20 inches in diameter. The antenna is a single piece of steel pipe tapering from 8 inches in diameter to 4 inches at the top. It weighs 1½ tons and is 44 feet 8 inches high. On it are projections characteristic of television antennae called "bat wings". They are about 3½ feet long x 2 feet wide, spaced the length of the antenna in groups of four. A red beacon for airplane protection tops the structure.

In order to raise the pylon, a wooden pole was lashed to the tower, extending above it. The pylon sections were hoisted from the top of this pole. The wooden pole was then lashed to the side of the pylon and the antenna was hoisted and dropped into place on the pylon.

New 10th and 11th Floors

The "suspended" television studio is the largest room in the new 10th and 11th floors built by Turner on top of the plant section of the building. The area is 54 x 110 feet and there are twelve rooms on the 10th floor and seven on the 11th. For this construction work 110 tons of steel were brought up over the side of the building from the street by derrick. Steel-frame construction was used in this area, with cinder-concrete floor arches and face-brick walls.

The television studio, 29 x 46 feet and two floors (19½ feet) high, is built as a room within a room to make it as vibration and soundproof as possible. Between the inner and outer walls are about 8 inches of insulating layers of rock wool and plaster on lath. The walls inside the room are covered with perforated Transite and have broken surfaces to provide more effective sound-suppression. Special care was taken in designing this area to combat the vibration from the newspaper presses housed on the lower floors of this section of the building.

The inside room is actually suspended in the outer shell. The ceiling is hung on spring hangers at 4-foot intervals, and the steel floor supports are laid on "isolators", islands of steel, felt, and rubber, which raise the floor of the studio above the concrete base floor. The space between the concrete and the studio floor is filled with rock wool.

The studio is provided with a sponsor gallery and a control room at second-floor level and separated from the studio by glass panels. A smaller news studio is adjacent to the main studio and is also acoustically isolated.

Steel-Mesh Floor Armors

A 20-page technical manual on the uses and installation of its line of floor and surface armors has been put out by the William F. Klemp Co., 6644 S. Melvina Ave., Chicago 38, Ill. The Hexteel heavy-duty surface armor and the Floorsteel flexible floor armor are open-mesh steel grids designed to be imbedded in concrete, mastic, or asphalt

to protect and reinforce them against impact, heavy loads, or other extra burdens to which they might be subjected.

Instructions provided in the catalog include how to lay the grids in new concrete; how to lay them over a concrete base and surface or fill them with asphalt, hot or cold mastic, or magnesite; and how to lay them over old concrete or wood floors. Each of these processes is illustrated in detail, including how to interlock the sections of the grids. Each important step in the process is illustrated by a photograph or drawing. Where alternative methods are permissible, these are described.

Catalog No. 142 also tells how to repair broken or crumbling floors, and lists other Klemp products with a short description of each. These include diamond, welded-steel, and steel-stair gratings and treads, as well as steel safety mats.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 82.



ON THE BEAM!
with
TUTHILL GUARD RAILS

Efficient: easily-seen, spring-mounted convex panels cushion and deflect blows.
Quick Installation: panels cut to convenient lengths, wide-spread posts. Economical: reasonable initial cost, easily installed, long life.

REQUEST DETAILS

TUTHILL SPRING CO.
762 W. POLK STREET, CHICAGO 7, ILLINOIS

YOU GET 3 Big Service Extras

—when you buy a ^{NEW} GM "71" Diesel Engine

1. Installation Inspection:

The GM Diesel representative inspects and checks the engine without cost to the owner; whenever possible this is done before the engine is put to work. He explains how to successfully operate the engine and the "preventive maintenance" necessary for best results in days to come.

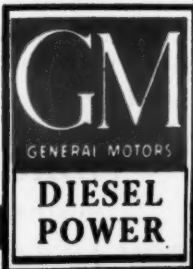
2. Performance Inspection:

From thirty to sixty days after the engine has begun its job, another inspection is provided without charge. The GM Diesel representative makes any adjustments that may be required and tunes up the engine to its best performance.

3. Owner's Service Policy:

Besides the above inspections, GM Diesel owners are protected by an exceptional warranty outlined in the owner's service policy.

WE WANT every purchaser or prospective purchaser of one of our engines to know how his local distributor and dealer, with their factory-trained servicemen, stand back of the product. They in turn are backed by the knowledge that Detroit Diesel supports them strongly in their adherence to this policy.



DETROIT DIESEL ENGINE DIVISION

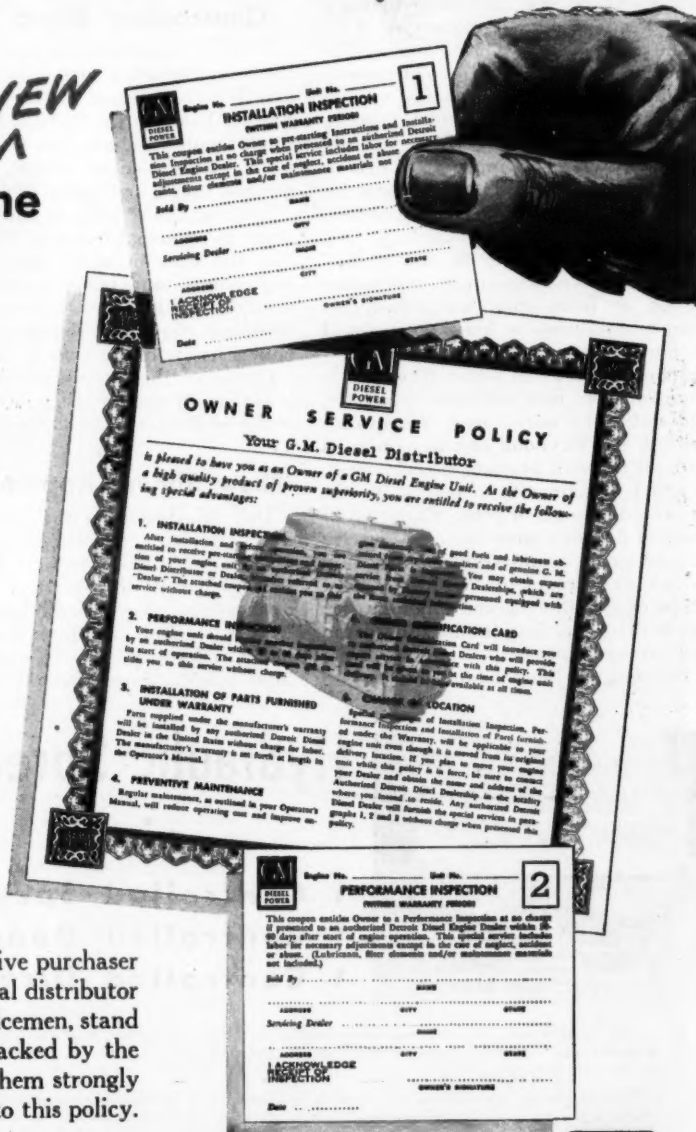
SINGLE ENGINES... Up to 200 H.P.

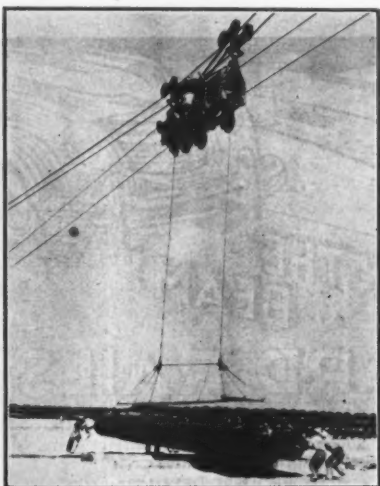
DETROIT 28, MICHIGAN

MULTIPLE UNITS... Up to 800 H.P.

GENERAL MOTORS

DIESEL BRAUN WITHOUT THE BULK





The Model 15SK4 Skyhook lowers a 7½-ton load of pipe at a storage yard in Saudi Arabia, after carrying it over 3 miles of cableway.

Overhead Carrier Is Cable-Suspended

A new aerial system of transportation for men and materials has recently been announced. Made by Pointer-Willamette Co., Inc., 238 N. E. Oregon St., Portland 3, Oreg., it is being distributed by John A. Roebling's Sons Co., 640 S. Broad St., Trenton 2, N. J. It consists of a Skyhook machine which travels on a specially constructed Skyroad cableway system. It is especially recommended by the manufacturer for use when working over rough and steep terrain where the cost of temporary truck roads would be excessive.

The Skyhook has wheels and can be driven to the job under its own power. It can also be used as a power unit to aid in rigging the Skyroad system. Speed of the unit, according to the manufacturer, is 35 mph. It is driven by a gasoline engine. The operator rides in the Skyhook carriage and can control all operations from his seat.

The Skyhook travels on, and is supported by, two wire-rope cables anchored at both ends and suspended from demountable or knockdown wood or metal towers, masts, or A-frames. Traction to move in either direction is obtained from two additional, separate, and stationary wire ropes. When suspended, the Skyhook can be equipped with all types of buckets, hooks, slings, or other attachments to permit its use on a wide range of jobs. Capacity of the unit depends upon size and capacity of the main supporting cables and towers, and ranges up to 10 to 20 tons. Scope of operations is controlled largely by the length of line the hoisting drum can accommodate.

Inasmuch as the machine and its load

travel through open jacks, Skyroads can be constructed in unlimited lengths as long as they are supported at intervals of from 500 to 2,000 feet. The direction of travel of the Skyroad can be altered by as much as 10 degrees at each station. The Skyroad is designed for easy transporting from job to job. If additional units are needed, they can be mounted in pairs, or several Skyhooks may be operated on the same cableway. It is also possible to build a main system with several feeder systems supplying it.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 2.

Lightweight Welder

A 200-amp arc-welding machine is announced by the Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y. This air-cooled gasoline-engine-driven unit is said to have a welding range of from 25 to 250 amps at 30 volts, on a cycle of 50 per cent duty.

According to the manufacturer, the Wasp Special is designed to furnish a smooth steady current and to stand up under usual and regular-duty factor-load conditions. It is recommended by Air Reduction for use on tough construction and maintenance jobs. Two outlets are provided for lighting purposes or to operate small power tools.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 5.

Contractors' Hand Tools

A line of miscellaneous hand tools for use by construction men is listed in Catalog No. 17-A issued by the Woodings-Verona Tool Works, Verona, Pa. These small tools include hammer heads, picks, mauls, sledges, chisels, mattocks, wedges, tongs, and many others.

Each of these units is illustrated to show its principal features. The catalog lists the sizes in which each is made, and points out what variations are available. It also shows pictures of the Woodings plant, and contains an alphabetical listing of the tools in the catalog.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 21.

Thew Shovel Appointments

Dell W. Savage is the new Eastern Sales Manager for The Thew Shovel Co. From his offices in New York City, he will handle the territory including metropolitan New York, Long Island, New York State, northern New Jersey, and Connecticut. He is succeeded as Mid-Atlantic Sales Manager by Robert

T. Maynard. Mr. Maynard formerly was Export Manager for The Osgood Co. He will aid in export contacts in the east as well as covering the territory of eastern Pennsylvania, southern New Jersey, Maryland, Virginia, North Carolina, and the District of Columbia. Joseph F. Beles has been named

District Sales Manager of the North Midwest territory with headquarters in Milwaukee, Wis. Beles, formerly associated with R. G. LeTourneau, Inc., and the Heil Co., will handle the territory of Wisconsin, upper Michigan, Minnesota, North and South Dakota, Montana, Wyoming, and Colorado.

The LOAD SEEMS Lighter!

STERLING WHEELBARROW CO., Milwaukee 14, Wis.

Yes, sir—the load really seems lighter when it's carried in one of these easy-wheeling Sterling barrows. For these sturdy Sterlings are equipped with smooth-running anti-friction bearings. Scientifically designed... well-balanced... actually 80% of the load is carried by the wheel; only 20% by the operator. While deliveries are still retarded, due to the material situation, we'll make every effort to serve you as soon as conditions permit.

Look for this Mark of
STERLING Quality

Sterling
WHEELBARROWS

15,000 V. P. M.

IN

CONCRETE

with
FLEXIBLE
SHAFT SPEED
OF ONLY 3,600 R. P. M.

This amazing step-up in frequency of the vibrator head is made possible by a patented, non-eccentric rotor device found only in Vibro-Plus "Rollgear" vibrators.

50% higher frequency guaranteed—Low speed flexible shaft

- save as much as a bag of cement per cu. yd
- concrete of uniform strength and density
- less mechanical wear and tear
- longer unit life

No time is lost for periodic stripping down. The flexible shaft can be lubricated in less than 20 seconds. *The Vibrator Head Runs Dry.* No clamping or screwing needed at the power source.

"Rollgear" is designed and built for long, uninterrupted work periods.

ELECTRIC GASOLINE PNEUMATIC

VIBRO-PLUS CORPORATION

Internal and External Vibrating Equipment
243 West 55th Street
New York 19, New York



Hydraulic Spreader gives

- ✓ **Controlled Speed**
- ✓ **Controlled Density**
- ✓ **Controlled Direction**



City, county and state highway departments use Hydro Spreaders because they provide the safe, sure way of spreading icy streets and roads. Easily installed on any dump truck with hydraulic hoist.

Material can be spread from 9 ft. to 35 ft. at speeds up to 30 m.p.h. All sprockets and chains are fully enclosed and material can be dumped over spreader without damage. One man can drive truck and operate spreader from cab.

An exclusive Hydro Spreader feature is the automatic gate opening device. When the driver starts the spreader the gates open and as the spreader is stopped the gates automatically close. There is no waste of material when spreader is not in operation. Hydraulic Spreaders are guaranteed to be free from defects in either materials or workmanship. Immediate delivery.

Write for illustrated folder.

Dealer territory available.

Paul M. Cole Company, National Distributor, 30 N. La Salle St., Chicago, Ill.

Hydro Spreader Corp. 247 Madison Street
Waukesha, Wisconsin

Road Is Relocated; Bridge Over Railway

(Continued from page 1)

ing to the original alignment. Consequently a new stretch of road is being built to the east which will by-pass the business center of town. On the new location the maximum grade is 7 per cent. At that point, the railroad has only two tracks, main line and siding. And the highway crosses them on a 4-span continuous concrete deck-girder bridge, 163 feet 7 inches long, center to center of end bearings. The new overpass, on a 16-degree skew and a 4.88 per cent grade, is about 500 feet east of the present grade crossing.

A contract including both bridge and highway relocation was awarded by the New Hampshire State Highway Department to W. H. Hinman, Inc., of North Anson, Maine, on its low bid of \$464,000. Work got under way in August, 1947, and is scheduled for completion this summer.

Highway Relocation

In its relocated position the new highway skirts Meredith Bay, an arm of Lake Winnepesaukee, and passes through one ledge cut of hard granite and also through a stretch of swamp-land. This widely different terrain in a short piece of road naturally called for a different approach in both the methods of construction and equipment used.

To remove the coarse granite, the contractor drilled blast holes with two Ingersoll-Rand wagon drills powered by two I-R 315-cfm air compressors. Drill steel, 1¼-inch-diameter, was employed in lengths beginning at either 4 or 6 feet, and increasing to 8, 12, and 16-foot sections. The bit sizes started at 2½-inch and decreased to 1½-inch. The holes averaged 3 to 3½ feet on centers, and were charged with du Pont 40 per cent dynamite. From 125 to 145 holes were shot at a time, and the rock yield averaged 1 cubic yard to a pound of dynamite. The depth of lift was around 14 feet.

The stretch through the swamp was about 2,000 feet long, with the muck or undesirable material extending down to a depth of from 6 to 8 feet. It was removed to a width of 60 feet by a Link-Belt Speeder crane equipped with a 75-foot boom and an Owen 1-yard clamshell bucket which cast the wet material off to the sides beyond the roadbed. Later when the muck had dried out thoroughly it was leveled off and spread out by a dozer.

Rock from the granite cut was loaded into Sterling 8-yard trucks, of which there were six on the project, and dumped into the swamp cut which formerly had been occupied by the muck. The ledge excavation was mixed in with dirt as it was dumped, but not enough material was available on the job for this purpose. The job, in fact, required 104,000 cubic yards of borrow to complete the embankments. A fine-sand borrow pit, ¼ mile from the north end of the job, supplied the necessary material. Another Link-Belt Speeder excavator on the job—a 1½-yard shovel—worked both in the rock cut and also in the borrow pit. Besides the contractor-owned Sterlings, five trucks holding 5 yards each, and hired by the hour, also hauled the sand. A couple of International TD-18 tractor-dozers spread the material out.

Gravel Sub-Base

Over the entire roadbed, out to out of shoulders, a gravel sub-base is being laid this year to a depth of 16 inches in the fills, 19 inches in the dirt cuts, and 21 inches in the ledge-rock cuts. The bulk of the grading was completed last season. The gravel was taken from a pit located 1½ miles from the north end of the job, and was handled by the shovel and trucks. It was spread by two



C. & E. M. Photos

At left, a Link-Belt Speeder 1½-yard shovel loads a Sterling 8-yard truck during grading operations on the Meredith highway-relocation job. At right, a Bucyrus-Erie 20-B ¾-yard drag shovel excavates the footing for pier 2 of the new bridge over the B. & M. tracks.

motor graders—an Adams and a Warco.

This season also the gravel sub-base will be primed with T-4 tar. After that a 3-inch road-mix pavement of RC-3 asphalt and crushed stone, 1½-inch down to ½-inch, will be laid to a width

of 24 feet and with a crown of ¼ inch to the foot. Beyond the pavement will be 6½-foot shoulders on a slope of

½ inch to the foot. The inner 4 feet of shoulder will be surface-treated.

(Continued on next page)

... Good Neighbors
KNOW good power



MODEL 6-BZU — 6 cyl.,
4 in. x 4 ¼ in., 320 cu. in.
displ., burns gas or gasoline

WAUKESHA ENGINES

GIVE MORE POWER...
USE LESS FUEL

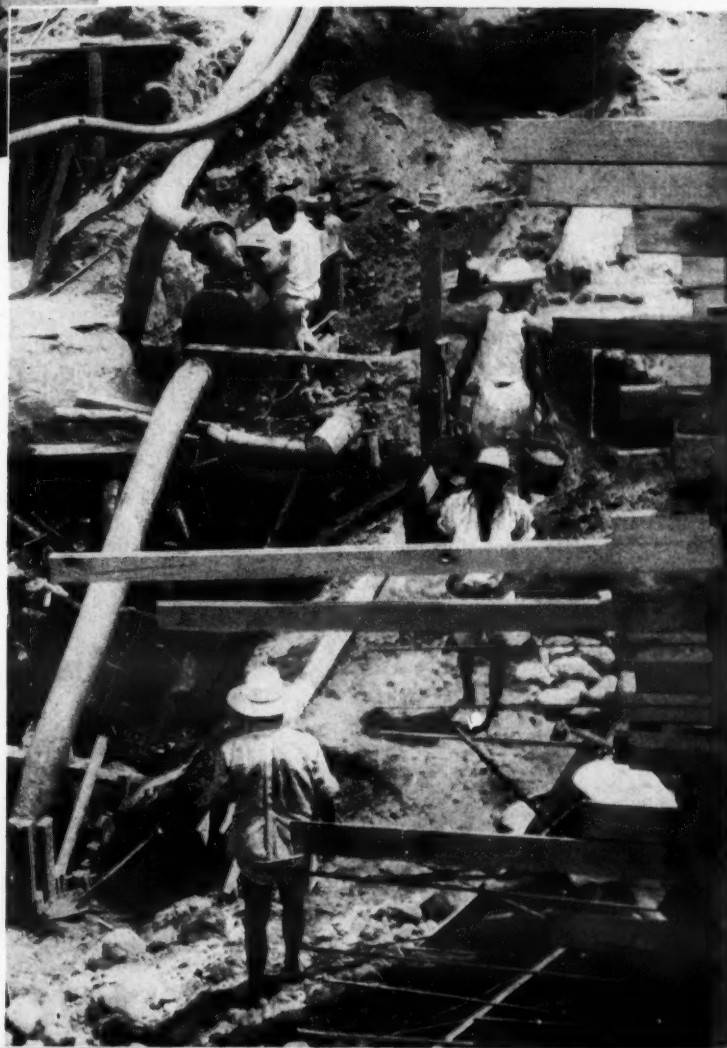
Canals for the Irrigation works at Antigua, Veracruz, Mexico, are being dug by the Compania La Alhambra, S.A. These good neighbors know good power. They get it from Waukesha Power Units. The one shown here, driving a Jaeger dewatering pump, is a Waukesha Model 6-BZU.

With the combination of its *Controlled Turbulence* Combustion Chamber and specially designed intake manifold more usable power is built into this Waukesha unit, in such a way that it can put out that extra power with increased fuel economy.

Specially shaped to increase turbulence, the *Controlled Turbulence* Combustion Chamber speeds up combustion in the orderly, progressive manner which reduces "ping," and insures the complete burning of the charge before the exhaust valve opens. This means less fuel, yet more power.

And the fuel charge is evenly distributed between the cylinders. That means *smooth* power. Heating of incoming fuel-air mixture varies, as load requirements vary. This makes the engine respond instantly to power demands.

Send for Bulletin 1269



WAUKESHA MOTOR COMPANY • WAUKESHA, WIS. • NEW YORK • TULSA • LOS ANGELES

Road Is Relocated; Bridge Over Railway

(Continued from preceding page)

In one section through the town, 1,000 feet long, the pavement will be flanked by a curb and sidewalk. For this piece, the pavement will be 28 to 30 feet wide. Beyond that stretch the curb will continue on one side for an additional 2,300 feet. The other side will have a military shoulder 10 feet wide.

Side slopes in the fills vary from a flat 6 to 1 slope in the swamp areas, to a 4 to 1 slope in fills up to 7 feet high. In fills over 7 feet the slopes are 1½ to 1, and are protected with guardrail. In dirt cuts the backslopes are 1½ to 1, while in ledge rock they are 1 to 4.

Along with the earth work, three large reinforced-concrete culverts were constructed to handle the streams passing under the road to empty into the lake. The largest culvert is a 200-footer, 5 feet 2 inches high x 14 feet wide. Of the others, one is a 6 x 6-foot, 100 feet long; and the second is 50 feet long x 7½ feet high x 10 feet wide. The latter culvert was built inside a wooden sheet cofferdam driven by a Chicago Pneumatic air hammer which was handled from the bank by a Bucyrus-Erie 20-B crane with a 45-foot boom. Air for the hammer was supplied by an I-R 110-cfm portable air compressor.

Highway Overpass

The 163-foot 7-inch length of the reinforced-concrete highway overpass is composed of two end spans of 35 feet 1½ inches each, and two central spans of 46 feet 8 inches. The three piers were numbered 2, 3, and 4, starting after the south abutment. Designed for H-20 loading, the new structure has a clear roadway of 28 feet which is flanked by two 3-foot sidewalks. The two B. & M. Railroad tracks will be crossed between piers 2 and 3 with a minimum vertical clearance of 20 feet 8 inches measured 4 feet off the center line of the main track. Over the siding track the clearance will be 18 feet 8 inches, measured 4 feet from the center line. Between piers 3 and 4 the vertical clearance is 14 feet 3 inches to allow for extension of the present street.

Last year the footings and substructures for the three piers and two abutments were finished; this year will see the completion of the superstructure.

Excavation for the footings was generally done with a Bucyrus-Erie 20-B ¾-yard drag shovel. All five structures are founded on hardpan exclusively, except at the north abutment where some ledge rock was also encountered. The north abutment has a bottom elevation of 537 for its 38 x 15½ x 3-foot-deep footing which supports three counterforts 17½ feet high. At the bottom the triangular-shaped counterforts are 13 feet 5 inches wide and taper to the top where they sustain a beam 3 feet 4 inches deep x 4 feet 5 inches wide.

The south abutment is up on a hill with a bottom-of-footing elevation of 564. The structure is shallow with a footing only 1½ feet deep, and having a length of 36 feet 6 inches and a width of 5 feet 5 inches. On the footing is a beam 3 feet 4 inches deep x 4 feet 5 inches wide.

The three piers are fairly similar. Their bottom elevation averages 542 feet, and the footings average 32½ feet long x 7½ feet wide x 3 feet deep. The footings support tapered pedestals 31 feet long and from 8 to 12 feet high. Three 2-foot-square columns rise from the pedestals 6½ feet to support caps 29 feet long x 3 feet wide x 2 feet deep. The columns are on 12½-foot centers.

The superstructure will consist of three arched longitudinal concrete girders 2 feet wide and from 2½ to 6 feet deep. They will be strengthened with cross girders, and support an 8-inch deck slab which will be covered with a 2-inch plant-mix wearing course. Where the tracks are beneath, the concrete will be covered with blast plates to protect it from deterioration from the smoke and fumes. On either side of the bridge a 3-foot-high guardrail will be erected.

Form Work and Concrete

Wooden forms were used for the structures. They consisted of ¾-inch sheeting backed by 2 x 6 studs on 16-inch centers, and double 2 x 6 wales on 24-inch centers. The forms were held together by Richmond Tysers and Economy form clamps. A Model 77 SkilSaw was used in cutting the lumber for the forms.

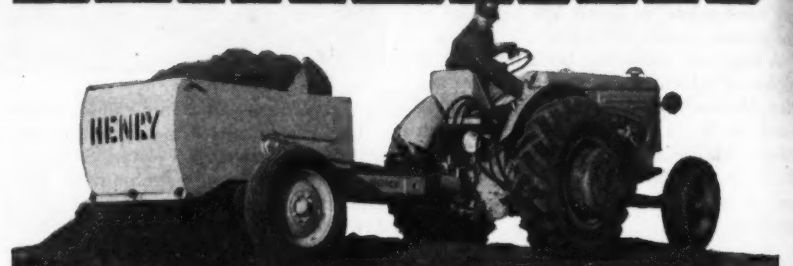
As each structure was being poured, two wooden bins were set up alongside to hold the aggregate. The bins, of ½-yard capacity, were erected on wooden platforms about 8 feet off the ground, one to hold the stone and the

other for the sand. In the footings the maximum size of aggregate was 2½ inches, while in the rest of the bridge the maximum size was 1½ inches. The aggregate was supplied by the Manchester Sand & Gravel Co. of Hooksett, N. H., 55 miles away. The company delivered the material to the job by

truck whenever it was needed. The trucks stockpiled the aggregate near the bins which were then loaded by means of a Farmall tractor equipped with a front-end shovel.

Lehigh bag cement was used, shipped from Alsen, N. Y., to the B. & M. siding (Concluded on next page)

MM INDUSTRIAL... Earthmovers



1-3 Yds. Per Haul • 12.6-14.5 M.P.H. Max.

High speed scraping and transport are done at low cost by the 27 H. P. RTI equipped with a 1 yd. pull behind scraper. 14.00-24 rear tires for added flotation and traction are optional equipment and give this model 12.6 M.P.H. on smooth surfaces.

For double capacity on larger jobs the 49 H. P. UTI pulls a 3 yard scraper. 18.00-26 10-ply rear tires are optional equipment that provides more flotation and a 14.5 M.P.H. road speed.

BE SURE TO ASK ABOUT...

the MM UTIL for front end loaders. This is the first reverse transmission equipment of its type and gives operators 6 reverse speeds up to 14.5 M.P.H. MM Industrial Tractors give you easiest steering offered in this type of equipment.

See Your MM Dealer-Distributor or Write



MINNEAPOLIS-MOLINE
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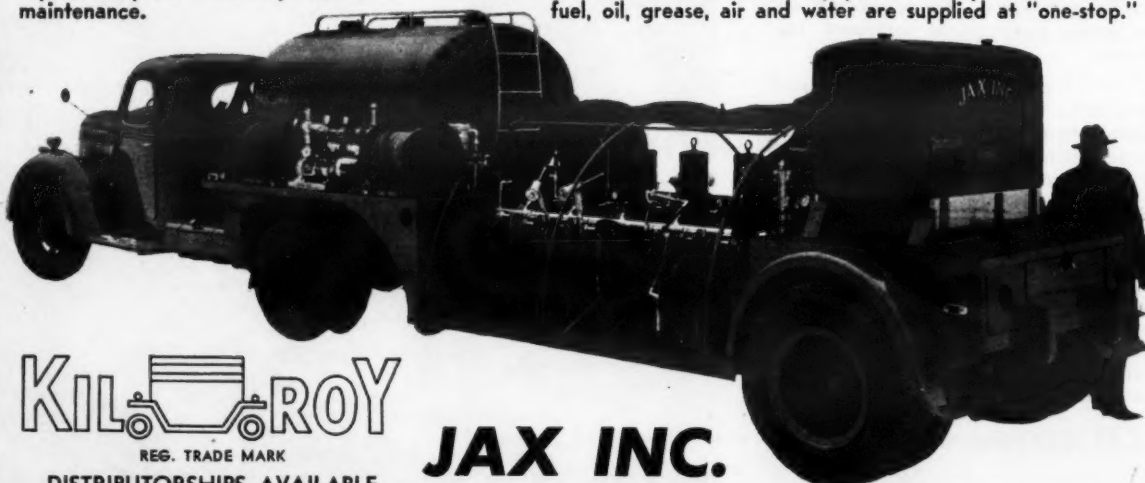
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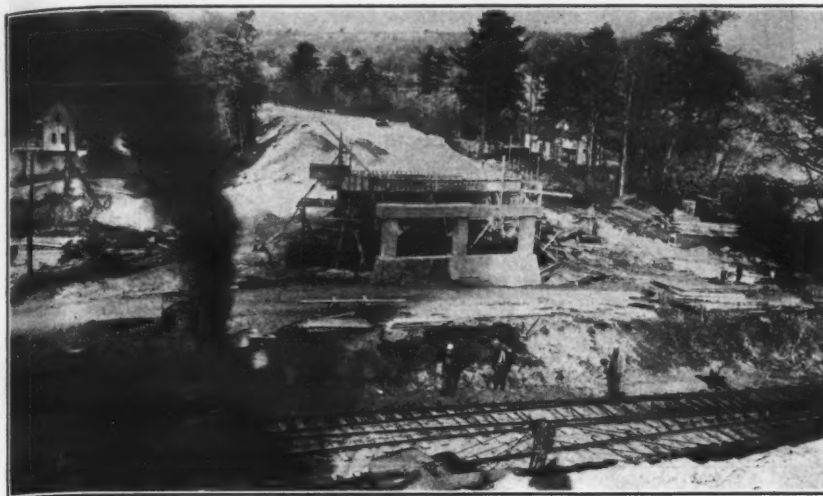
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is Information
Headquarters

for contractors, highway officials and distributors wanting further details or printed matter from the manufacturers advertising in these pages. Our Reader Service Department will be glad to forward any literature or special requests you mail to us at the above address.

**CONTRACTORS AND
ENGINEERS
MONTHLY**



C. & E. M. Photos

at Meredith. From there it was trucked out to the job and kept under tarpaulins. The reinforcing steel came from the rolling mills of Bancroft & Martin Co. in South Portland, Maine, and was delivered to the job after a 100-mile truck haul. The local water supply was tapped to supply water for the Koehring Dandie 10-S 2-bag mixer.

The aggregate was discharged from the bins directly into wheelbarrows which were then weighed on a Fairbanks beam scale before being dumped into the mixer skip. The bag cement was added by hand. The concrete was discharged into a 1-yard bucket which was lifted to the forms by the Link-Belt Speeder crane equipped with a 45-foot boom. As it was placed, the concrete was vibrated by an Electric Tamper hydraulic vibrator.

In pouring the counterforts or columns, the concrete bucket was emptied into a 3-foot-square steel hopper to which 4-foot lengths of 10-inch-diameter elephant-trunk pipe were attached. The concrete went up in 2-foot lifts. The yield of the mix was 5.8 bags to the cubic yard of concrete. The weights of a typical 2-bag batch were as follows:

Cement	188 lbs.
Sand	428 lbs.
Stone	740 lbs.
Water	10 gals.

Quantities and Personnel

The major items in the contract include the following:

Earth excavation	62,000 cu. yds.
Edge excavation	8,400 cu. yds.
Borrow	104,000 cu. yds.
Concrete pipe, 12 to 36-inch	3,250 lin. ft.
Metal underdrain, 6 to 15-inch	2,400 lin. ft.
Gravel sub-base	33,000 cu. yds.
Tar prime	35,000 gals.
Asphalt for road-mix	68,000 gals.
Stone for road-mix	6,400 tons
Concrete	1,367 cu. yds.
Reinforcing steel	182,000 lbs.

A force of about 70 was employed by W. H. Hinman, Inc., on both the road and bridge phases of the contract under the direction of E. M. Newman, General Superintendent. G. Dewey Rice was Superintendent on the road work, and Al Lattin was Superintendent on the overpass. C. L. Tillotson was the engineering representative for the B. & M. Railroad.

For the New Hampshire State Highway Department, Nicholas J. Cricenti was Resident Engineer on the bridges and drainage structures, and O. D. Lindsay was Resident Engineer on the highway. The Department is headed by Frederic E. Everett, Commissioner, with

D. H. Dickinson, Chief Engineer, R. H. Whitaker, Construction Engineer, and H. E. Langley, Bridge Engineer.

Remember—Safety Is No Accident!

Above is a view of completed pier 4 and form work for the north abutment of the new overpass which W. H. Hinman is building on U. S. 3 at Meredith, N. H. A B. & M. locomotive is about to pass on the main-line track. In the other picture, left to right, are Nicholas Cricenti, Resident Engineer on bridges and drainage structures; O. D. Lindsay, Resident Engineer on the highway; G. Dewey Rice, road-work Superintendent; Al Lattin, Overpass Superintendent; and General Superintendent E. M. Newman.

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Seven-Mile Conveyor For Bull Shoals Dam

A 30-Inch Belt Conveyor Built Through Rough Hills To Carry Quarried Rock To Job Crushing Plant

FOR 7 miles through rough hills in northern Arkansas, men of the Ozark Dam Constructors are building a big new 30-inch belt conveyor. By autumn of 1948 the long conveying system will be finished and will go to work. When it is placed in operation, the conveyor will carry all the rock, from which aggregates and sand are to be made for Bull Shoals Dam, (see article on page 2) to the crushing plant near the dam site.

The job of locating and building the big conveyor has been a sizable project in itself, because of the nature of the terrain and the large quantities of materials to be handled.

When the conveyor goes into operation, it will have all the latest improvements that men were able to think up. It will be arranged in 21 separate flights, with maximum grades of 31.2 per cent downhill and 28.3 per cent uphill. The longest flight will be over ½ mile long. The belt will travel at a speed of 550 feet per minute, and will carry a peak load of 650 tons an hour.

The big conveyor will have self-sealing Timken roller bearings. All flights will be equipped with automatic hold-back brakes to prevent the loaded belt, once it has been stopped, from rolling back. Special receptacle boxes will transfer the material at the end of each flight with a minimum of wear on the belt or the box metal. On a few of the steep flights there will be special counterweights, sliding up and down in a tower, to maintain the belt at even tension. There will be 2,025 horsepower at work on the line, and the big electric motors will be controlled through a few push-button stations.

The conveyor line was necessary, because the only good source of limestone rock large enough to produce 2,100,000 cubic yards of concrete was situated in a high bluff near Flippin, Ark., about 37,500 feet from the dam. Various schemes for moving the mate-

rial were studied, including highway and trucks, and railroad, and the conveyor method was finally settled upon.

Description of Conveyor

The conveyor belt itself was purchased from Goodyear Tire & Rubber Co. It is a 30-inch 8-ply piece of material. It will roll over Robins idlers. Troughing idlers are being set on 4-foot centers, and the return idlers are going in on 12-foot centers. The return idlers are below the stringer of the support framework to permit easy inspection of the belt at any time.

Self-aligning idlers at strategic points will hold the belt straight and fight its tendency to crawl to one side.

Idlers, belt, and the structural-steel hoppers at the transfer points are sup-



C. & E. M. Photo

Brown & Root Engineer M. M. Robinson stops to examine an idler on the Bull Shoals Dam conveyor system. In the far background is the White River and the dam site.

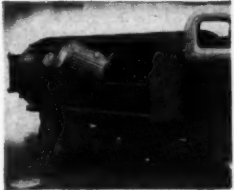
ported on a timber framework of bolted construction. The uprights and sway braces are mostly native pine and oak

timber, but the 2 x 12 stringers made of long sections of Douglas fir were im-

(Continued on next page)



High Tipper Rock and Ore Hoists and Bodies



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"Super" Hydraulic Hoists and Bodies for all trucks



Heavy Duty "Super" Hoists, Bodies up to 30-ton capacity



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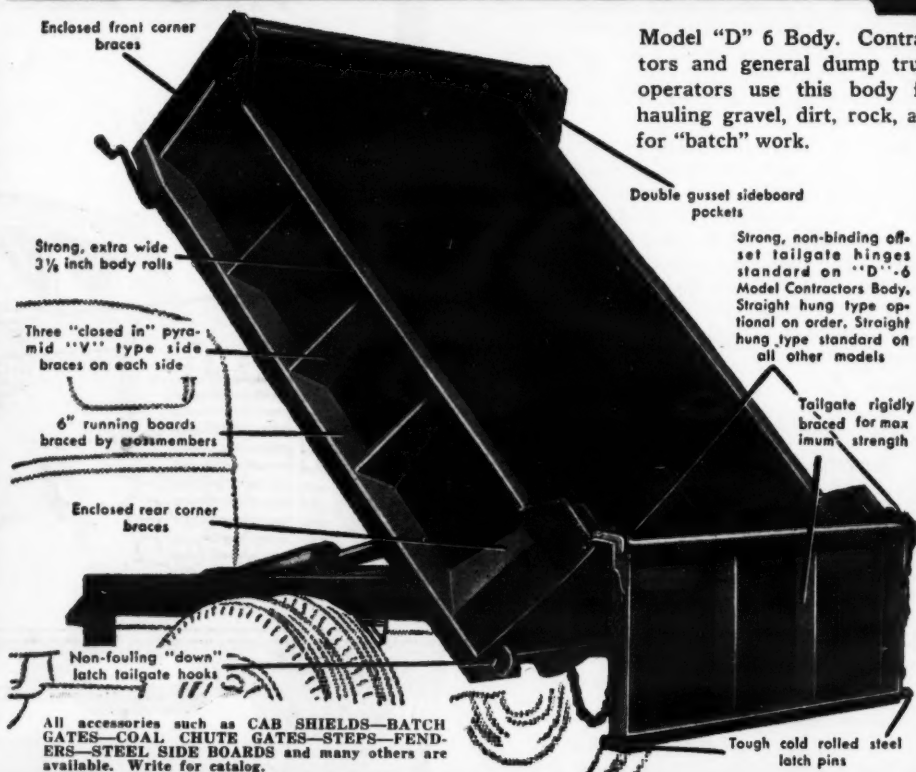


Special Low Mounted Garbage Body



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THIS SPECIAL BODY FOR STREET AND HIGHWAY DEPTS. IS IDEAL FOR MANY OTHER JOBS MODEL D-18



This Body is the most versatile on the market for the general dump truck work of street and highway departments. The hinged sides, when lowered, hang straight down for easy loading or unloading, and give extreme LOW LOADING HEIGHT. The tailgate, when lowered, makes an ideal body for hauling long branches, timbers and forms.

Available in 78" and 84" inside width only, and 7 ft. to 10 ft. lengths, in any capacity up to 3 cubic yards. Ends extend 7" higher than sides. 10 gauge steel throughout.

Notice in photograph extreme LOW LOADING HEIGHT for hand shoveling. Three-fourths of load can be loaded at PLATFORM HEIGHT.

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C. & E. M. Photo

The light streak you see across the rough Arkansas country is the cleared right-of-way for the conveyor line between the quarry and Bull Shoals Dam. That's M. M. Robinson, Engineer of the Brown & Root organization, with his back to the C. & E. M. camera.

ported from the west coast. The uprights vary in size, depending on the height of the belt above ground, and most of them were set on special precast concrete pedestal pads, with an embedded metal strap to hold the timber.

Some of the flights are driven from the head end, some from the tail end. Eighteen 100-hp electric motors, all thoroughly reconditioned, were brought in for the heaviest flights. Three flights are driven by 75-hp motors.

Beginning at the quarry end, the flights were numbered from 1 to 21. The length of each flight is as follows:

No. 1	1,900 ft.	No. 12	1,650 ft.
No. 2	2,580 ft.	No. 13	1,400 ft.
No. 3	2,620 ft.	No. 14	2,094 ft.
No. 4	1,900 ft.	No. 15	838 ft.
No. 5	1,400 ft.	No. 16	587 ft.
No. 6	1,661 ft.	No. 17	2,300 ft.
No. 7	1,525 ft.	No. 18	1,265 ft.
No. 8	2,800 ft.	No. 19	600 ft.
No. 9	2,228 ft.	No. 20	918 ft.
No. 10	2,138 ft.	No. 21	902 ft.
No. 11	1,669 ft.		

Route Hard to Locate

Aerial photographs were used for the initial stages of location work, but two survey parties also worked about seven months running topographic surveys for the final location. According to M. M. Robinson, Engineer of the Brown & Root organization from Austin, Texas, it was the toughest country on a man's feet he had ever encountered in 30 years of road building.

Looking at the finished location from the quarry towards the dam, one sees a relatively straight cleared line through valley after valley and over the hills.

Methods of Construction

Construction plans called for the conveyor line to be set in the approximate center of a 100-foot-wide clearing. Besides the conveyor belt there was to be a 22-foot patrol road suitable for job vehicles, a telephone line for the maintenance electrician to use in patrol work, and a power line to bring in electricity from the Arkansas Power & Light Co.

In general, the right-of-way was first cleared, the patrol road and con-

veyor line built together, and the power-line work followed close behind.

The route was covered with heavy timber: oak, hickory, elm, and other tough trees. Labor gangs came in with saws and axes, and the trees were felled about 24 inches from the ground line. The stumps were then dug and pushed out by Caterpillar D8 tractors with Caterpillar bulldozer blades, and rear-end winches. All the stumps and brush were piled together and burned.

The patrol road was also roughed in by the dozers, following the general grade of the conveyor path. After it had been pioneered, a Caterpillar motor grader dressed it down, and some gravel was spread where it was needed. The haul road was built slightly ahead at all times, so trucks could get in with materials for the conveyor.

Precast concrete pads, 10 x 12 x 4 inches in size, were made up. A metal strap was anchored in the concrete, to which the upright timbers later could be spiked. These were trucked out to the job and distributed as fast as the



C. & E. M. Photo

Here's a detailed view of the conveyor uprights and stringers at Bull Shoals Dam, with the crew at work on them.

patrol road was built.

Timbers came in the same way. Douglas fir timber, all idlers, and the

belt itself came in by railroad, and was unloaded at the dam site from the cars. (Concluded on next page)

LOOK AT THE FRONT END

shows another reason why

SHOVELS . . . Stay on the Job!

"LIMAS GIVE THE LEAST TROUBLE OF ANY MACHINES WE HAVE"

THIS STATEMENT from a customer is typical. LIMA excavating equipment has that extra "built-in" stamina which means increased production and minimum "down-time"

Take, for example, the Front End of the Shovel. Look at the sturdy boom—of all-welded construction with

inside reinforcements for extra strength. Shipper shaft is splined for permanent alignment with crowd chain sprocket and pinions. Location—not on top, but near center line of boom gives better support, and at extended position allows direct pull, minimizing strain on cable, racking, shaft, and boom, also allowing higher lift and increased working range.

The smooth machined throat of the large diameter sheave is a machined groove—accurately centered to shaft—with no high spots to wear cables. Independent chain crowd permits shaking of dipper. Spring bumper blocks take shock of dipper door and wood bumper blocks absorb shock of dipper at base of boom. Every component is designed for highest output with minimum maintenance.

Lima shovels range from 3/4 to 6 yard capacities, cranes from 13 to 100 tons. Write for descriptive bulletins.

LIMA Type 1201 Convertible Shovel, Crane and Dragline.



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THE HAYWARD CO., 32-36 Dey St., New York

Hayward Buckets

Seven-Mile Conveyor For Bull Shoals Dam

(Continued from preceding page)

The idlers were checked, the fittings greased, and they were also distributed. Surveyors worked with the carpenter crews, giving the men line and grade. Ordinarily, one section or flight was finished before moving on to the next.

The special transfer boxes at the end of each flight are the product of many men's imagination. They are built in such a way that the load of rock will dump off the end of the conveyor and fill a small embrasure with material before it passes on down the throat. With this small compartment full of rock, material passing through the device will spend its force and abrasion against other rock particles, rather than against the transfer-box metal. The device will slow the rock down, and drop it gently to the next flight. Where the rock drops down on the next belt, there will be special impact idlers to support the belt.

Operating Plan

Briefly, the operating plan is expected to be this:

Two big primary crushers at the quarry will deliver 6-inch-minus material to a 20,000-ton surge pile, under which will be a 108-inch Armco Multi Plate pipe. The gates in all tunnels will open by means of air rams and solenoid valves from remote-controlled push buttons. The material will travel over the conveyor at the rate of 550 fpm and 650 tph to the dam, where at least a 10,000-ton surge pile will also be maintained.

At the dam, the material will pass through a 5½-inch Symons cone crusher and screening plants. Sand

will be made by Cedarapids hammermills and Pennsylvania impactors. All finished aggregates and sand will then be delivered to the mixers at sub-normal temperatures, with larger sizes of aggregate cooled by immersion in 35-degree water. So far as is known by men on the dam, it will be the first time the immersion method has been tried in such magnitude.

Electrical push-button controls on the conveyor will be so arranged that if a flight in the center of the system is shut off, everything behind it will shut down also. The whole scheme is designed to produce a smooth, high-capacity, flexible flow of concrete materials to the dam, in such a way that concrete pouring will proceed rapidly and with minimum interruption.

Waterproofing Agent

A waterproofing agent for covering all types of concrete, cinder-block, brick, stucco, and other porous surfaces is announced by the American Asbestos Products Co., 8000 Franklin Bldg., Cleveland, Ohio. According to the manufacturer, Marva-Seal can be applied with brush, squeegee, or trowel, and one application is sufficient to fill all porous surfaces and openings.

Marva-Seal consists of a permanent oil base reinforced with pigment and asbestos fiber. The manufacturer explains that it contains no alkalis or other ingredients which harm surface paints; and that it will not discolor, peel, or flake. Marva-Seal can be applied thick enough to hide mortar joints and uneven surfaces, or thin enough just to seal and waterproof the porous surfaces.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 17.

Catalog on Line of Pumps

A 4-page catalog on several of its pumps has been prepared for distribution by Marlow Pumps, Ridgewood, N. J. The types of pumps described in its Bulletin No. G-47 are: self-priming centrifugal, general-service, high-pressure, electric and belt-driven units, diaphragm and plunger units, and

sludge types.

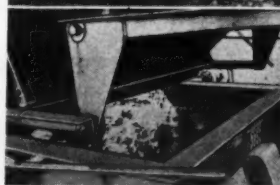
There is a brief description of the capacities and principal construction and operation features of each model. This is supplemented by drawings and photographs. The bulletin also contains a list of typical applications.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 20.

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Safety and simplicity of application—Bitucote Emulsions, mixed with local aggregates, are applied unheated and with ordinary road equipment.

That's Why You'll Often Find Bitucote Men and Material On The Same Jobs

Bitucote engineers and laboratory chemists are constantly working and consulting with road engineers and contractors so that Bitucote Emulsions may be formulated to the practical requirements for good road building and maintenance at low cost.

In the interest of better road construction and a high standard of road materials, Bitucote engineers and chemists contribute their efforts to adoption of rigid, uniform specifications.

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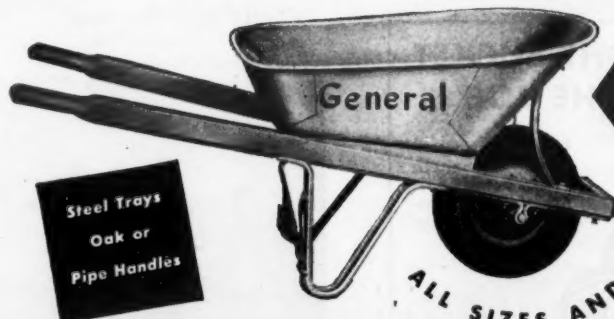
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"The Wheelbarrow with Orange Handles"



The Dumpcrete Body

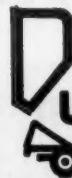
Lightweight, water-tight, loads fast, dumps fast or slow, places anywhere, costs less to buy and run. Ideal for hauling aggregate, coal and earth.

* Dumpcrete Concrete is central-mix air-entrained concrete hauled and placed with the speedy, low-cost Dumpcrete. Provides top-quality, plastic, workable and non-segregating concrete, saving up to \$1.00 per yard.

The Utah Construction Company is hard at work on a power plant tunnel job high in the Sierra Nevada Mountains. The mixing plant is set up at the main concrete pour . . . but two miles away over rough construction roads, is the other end of the tunnel—and another pour.

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DUMP CRETE DIVISION

MAXON CONSTRUCTION CO., INC.
488 Talbot Bldg., Dayton 2, Ohio



Unique Cofferdam At Bull Shoals Dam

(Continued from page 2)

The downstream cofferdam was built of earth and rock, excavated from the river channel. It is 850 feet in length, and is protected from wave damage by dumped riprap.

Still another structure was built with the first-stage diversion cofferdam. This was the closure works, which will come into use when second-stage construction is done. Second-stage protection to elevation 509.5 is required. The closure works is nothing more than 16 piers 23 feet center to center, set on a concrete floor slab across the river floor. Each pier is 80 feet wide at the base, 12 feet at the top, and 3 feet thick. The upstream ends of the piers, built on a 1 to 1.2 slope, will later be closed tight by laying reinforced-concrete stop logs 30 to 18 inches thick and 23 feet long from the river floor upwards.

Construction of these piers was stopped at the same elevation as the cofferdam and a temporary bridge laid to carry air, water, and power lines.

In cross section, the main concrete cofferdam was designed 30 inches wide on top, with a vertical face on the river side and 6.25 to 10 slopes on the inner face. The only extra material in the cofferdam outside of the concrete itself consisted of four 36-inch Hardesty gates in the river arm to permit flooding of the inner area. Formed holes have been provided by the use of 3-inch paper tubes in the upstream arm. After the cofferdam has served its purpose, these holes will be filled with dynamite and the top 15 feet of the upper cofferdam will be blown off, to an elevation slightly below the outlet gates. The river arm will have to be excavated; part of it will be used for the second-stage river arm.

Cofferdam Construction

When the cofferdam was started, the White River channel lay close to the right abutment, leaving a broad plain near the left side. The major part of the upstream arm was excavated to rock by dragline, and the trench protected by a temporary earth and rock levee upstream. The upstream arm was then largely placed, in 100-foot blocks with 5-foot lifts, while further preparations were under way on the river arm and closure works.

The closure-works foundation was also excavated by dragline in the dry, and a 300-foot diversion channel dug for the river diversion. This excavation also uncovered the site of the river-arm cofferdam foundation. The closure works and the river arm of the cofferdam were then placed. Material excavated by the Lima 802 and 1201 was hauled by rear-dump Euclids and used for the downstream levee.

About 47,000 cubic yards of concrete went into the closure works and the cofferdam structure. It was originally

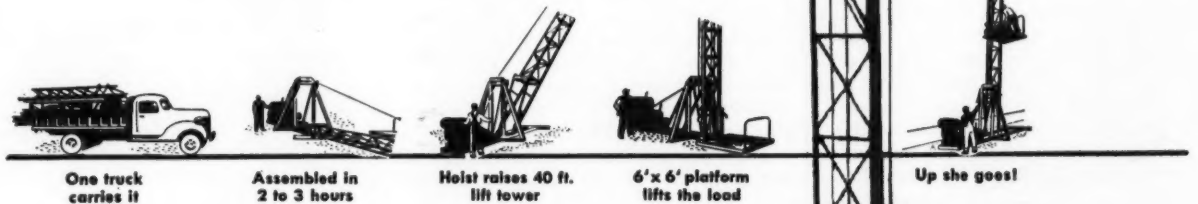
hoped that truck-mixers could be used, but a 27-E mixer was substituted and
(Concluded on next page)

The picture at left shows drilling equipment, a Lima shovel, and a rear-dump Euclid working on the left abutment of Bull Shoals Dam site. At right, a close-up shows powdermen loading a hole with Hercules powder, the dipper of one of the Lima shovels in the rear, and two of the Ingersoll-Rand wagon drills.

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Material Elevator carries 2,500 pounds
to 40 feet or higher at 87 feet
per minute!**

*Moves anywhere by truck . . . sets up quickly by
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The skip platform is 6' x 6'; holds two wheelbarrows; lifts 2500 lbs. For jobs higher than 40 feet, two 10' tower extensions can be added.

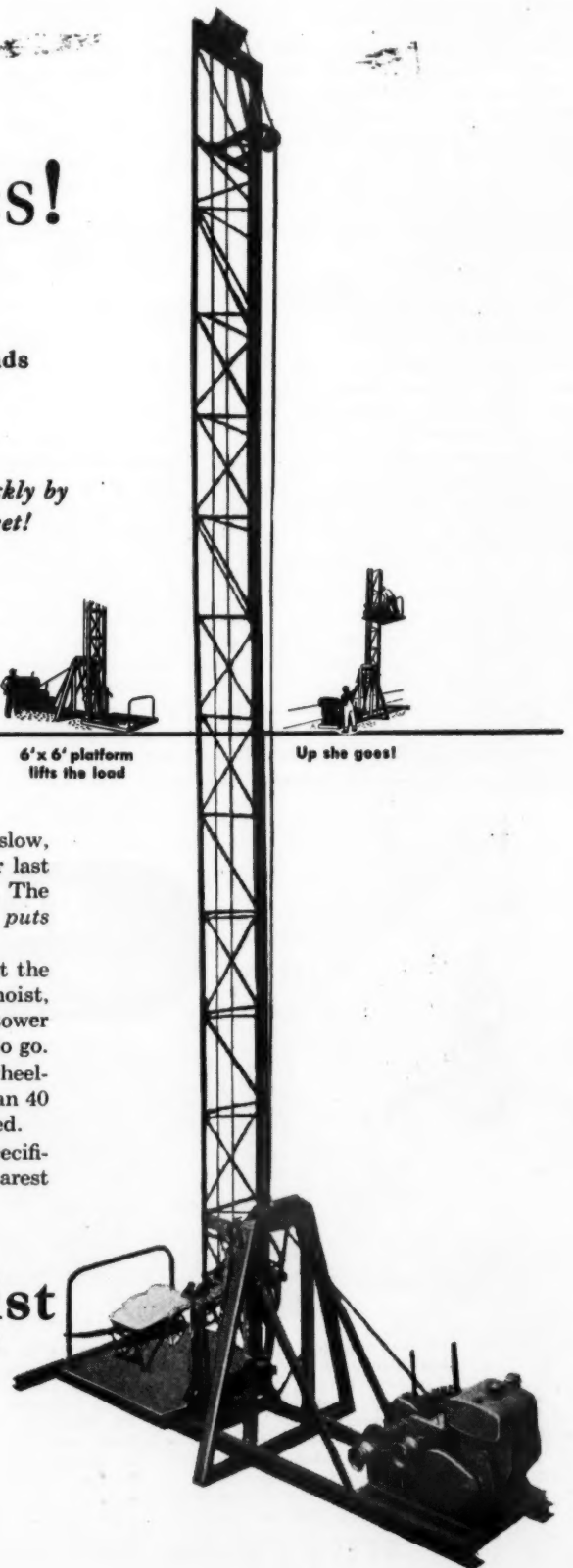
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Unique Cofferdam At Bull Shoals Dam

(Continued from preceding page)

set up ahead of the structure on the flood plain. The concrete was made out of river-run gravel, without any proportioning, and mixing water came from the stream. The material was transferred from the mixer to a 1-yard concrete bucket, which was then raised to the blocks by a small truck crane on the job. Wood panel forms 5 feet high and 10 feet long were used.

The entire first-stage cofferdam was built with no flood damage from the White River. The stream stayed at low stage and hardly a man got his feet wet.

The completed cofferdam will train the river through the closure works and down the left bank until the first-stage construction has been finished within the cofferdam area. During this first stage, the dam within the cofferdam limits will be built to elevation 484. Included in this construction will be sixteen 4 x 9-foot steel outlet gates, set in outlet adits.

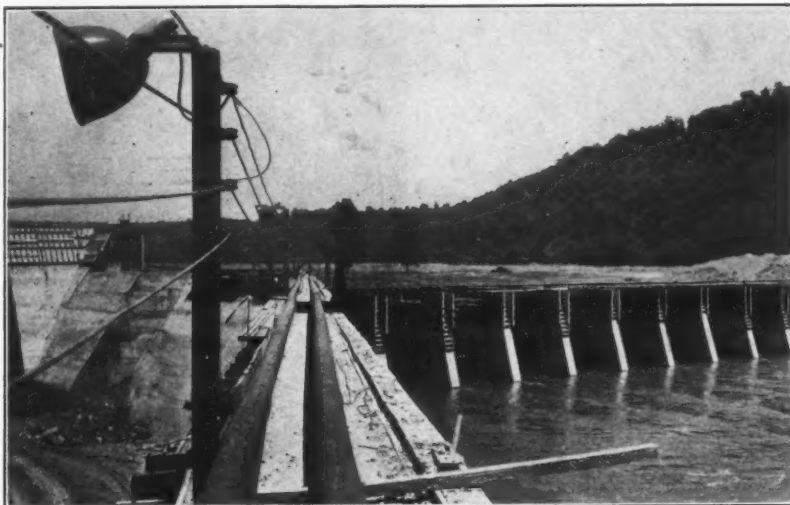
In the second stage, flood protection to elevation 509 will be provided by the closure works, a short wall, two timber cribs and an embankment, and on the dam itself by the construction of one monolith to that elevation. During the second-stage diversion, the river will flow through the outlet adits in the dam. Should a serious flood occur at this time, the water would overtop first-stage construction and flow across the completed dam.

Excavation Follows Concrete

When Bull Shoals Dam was visited in late May, much of the early excavation work had been done to expose the dam foundation within the working area. Considerable work was done on the foundation before attempting to blast the right abutment to solid material, but this work was started in time to tie in with the completion date for streambed excavation.

Overburden above the solid limestone rock foundation of Bull Shoals Dam consisted of dirt, sand, stream pebbles, gravel, boulders, shale, and rotten rock. All this material had to be removed as soon as possible to ready the site for the massive concrete dam.

The fleet of equipment assigned to this work consisted of 9 Ingersoll-Rand



C. & E. M. Photo
From the top of the cofferdam at Bull Shoals dam site: two 6-inch air lines, power and light lines, one of the Hardesty gates, and part of the river-diversion structure.

wagon drills with Ingersoll-Rand steel and Jackbits, air from a stationary compressor plant in the permanent compressor house on the right abutment, a Northwest 80-D shovel, a Lima 802 shovel and a 1201, and a total of 9 end-dump Euclids.

To take care of the drilling problem, a bit and steel-dressing shop was also set up. A complete line of equipment was brought in to duplicate as nearly as possible the initial manufacture of the steel and bits. The machines were all Ingersoll-Rand, and included a drill-steel cutter and shank grinder, a steel sharpener, a steel furnace, a Jack-bit furnace, a Jackmill, a draw furnace and salt-water bath, and a bit grinder.

In general, maximum steel lengths were 16 feet, although a few 18 and 24-foot holes were put down. Since some of the holes were slightly wet, it was expedient and desirable to stick to the shorter lengths because of the difficulty in blowing drilled fines out of the bottom of the hole. Too, this length of steel approximated the width of many lifts necessary to reach bedrock.

The rock was not too hard on drill bits, and frequently they lasted 8 to 10 hours in service. Hard rock seams were found in a few places which dulled steel much more rapidly, however. The general average for the bit shop was 900 bits resharpened per day, and about 80 pieces of steel repaired.

The holes were loaded without springing with Hercules Hercomite and

Gelamite powder, and the shots were pulled with electric blasting caps.

As the overburden was broken up with explosives, the Lima shovels moved in and scooped it up to the Euclids. It is a tribute to the efficient planning of this material removal that, out of the first 1,300,000 cubic yards moved, only 18,000 cubic yards were wasted. The remainder was all used in necessary work to get the main job going. The lower cofferdam levee was built from this material, a huge shop and administration headquarters with attendant storage yards was built up, and much of the material was used to cover pipe tunnels which later will be under the big aggregate stockpiles.

Under the big main yard now used by Ozark Dam Constructors, the material was dumped at random and topped off about 5 feet below final elevation. Selected rock was then used to build the fill up to final height, and it was given a leveling course of fine material. The result is a good smooth yard, free-draining and dry in wet weather, on which haul roads are now easy to maintain.

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The Rogers policy is to utilize the basic proven designs in building all trailers but to modify them as desired and most practical to meet the specific needs and personal preferences of each purchaser.

In other words, Rogers Trailers are "tailored to each specific need" but built on a basis that utilizes economical, high production methods. Thus, purchasers obtain the utmost in performance and value.

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You'll certainly want to write for the large illustrated Rogers Catalog which illustrates and describes in detail the complete line of Rogers Trailers.

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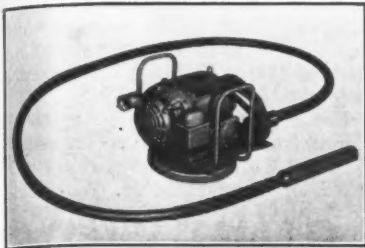
NETCO
CATCH BASIN CLEANER

Can be mounted on any short wheel-base truck having at least 8 ft. in back of cab. You can purchase unit separately and mount on your own chassis . . . The Netco Unit can be removed from truck in 30 minutes, permitting use of truck for other purposes. The Netco Bucket closes pneumatically assuring positive and maxi-

mum digging efficiency . . . The Bucket has full 1½ cu. ft. capacity with no chains or linkage to obstruct operation. The Netco Catch Basin Cleaner is faster, safer and more economical to operate than any other method used to remove debris from catch basins. Send for illustrated folder.

NETCO DIVISION CLARK-WILCOX COMPANY

118 Western Avenue, Boston 34, Mass.



The new Stow electrically powered concrete vibrators come in two models—one with a speed of 6,000 vibrations per minute, and the other with 7,600.

Concrete Vibrators Are Electric-Powered

A new line of electrically powered concrete vibrators has been introduced by the Stow Mfg. Co., 40 Shear St., Binghamton, N. Y. They are made in two models and feature totally enclosed splash-proof electric motors, watertight control stations and cable connectors, ball-bearing countershafts adjustable for belt tension, and 360-degree swivel mountings.

Model HE has a speed of 6,000 vibrations per minute under full load, according to the manufacturer. It is powered by a 3-hp 220/440-volt 60-cycle 3-phase motor. It comes equipped with two 7-foot sections of vibrator shaft and a 2½-inch-diameter vibrator head.

Model JE6 is rated at a speed of 7,600 vibrations per minute at full load. It is powered by a 1½-hp 110/220-volt 60-cycle single-phase motor. It comes equipped with two 8-foot sections of vibrator shaft and a 1½-inch-diameter vibrator head.

The shafts from the motors to the vibrating heads are joined in sections and can be extended to a total length of 35 feet. They are reinforced by flat coils at each end. Either model can be mounted on a rubber-tired wheelbarrow, if desired.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 39.

Eichleay Opens in 'Frisco

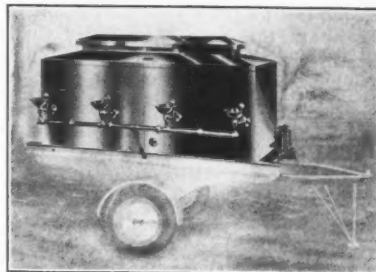
The contracting firm of Eichleay Corp. has announced the opening of a Western Division office in San Francisco at 322 Monadnock Bldg., 681 Market St. This office will handle construction contracts west of the Mississippi and Missouri Rivers. Eichleay provides several types of contracting serv-

ices, including the moving of buildings, shoring, rigging, underpinning, foundations, installation of equipment, steel erection, and the reconditioning of industrial plants.

Mobile Water Cooler

A mobile cooler for drinking water on construction jobs is available from the Filtrine Mfg. Co., 53 Lexington Ave., Brooklyn 5, N.Y. Its function is to travel with the work crews to job locations and to provide cool, clear, dechlorinated water for groups of up to 300 men.

The Filtrine unit consists of a heavy-duty automatic refrigerating machine and a large-size chilled-water reservoir of 25 gallons, housed in a weatherproof



The Filtrine mobile water cooler can travel to job locations and provide cool, clear, dechlorinated water for crews of up to 300 men.

stainless-steel cabinet. It measures approximately 60 x 30 x 24 inches. Up to eight sanitary-type stainless-steel bubblers are provided for drinking at

either side of the cooler. Self-contained filter-dechlorinators are built into the unit. It is anchored on 4-inch I-beams for mounting on trucks or trailers.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 123.

Garrison Joins Timber Co.

J. C. Garrison, structural engineer, has joined the Timber Engineering Co. of Washington, D. C. His work in the Engineering Department will include timber designing, testing, and sales-promotion work. Mr. Garrison previously served on the engineering staffs of the J. D. Hedin Construction Co. and the District of Columbia Highway Department.

VARIED CRANES and OPERATIONS Feature **OWEN** The Universally Popular **BUCKETS**

THE world scene is dotted with busy cranes of varying kinds and types in widely differing operations.

It is significant, however, that in a large percentage of cases the bucket is an OWEN.

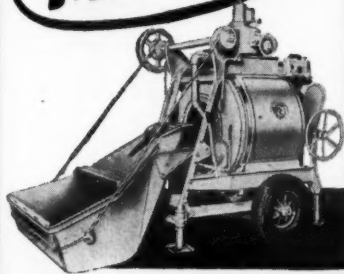
This universal acceptance goes back years to the inception of a basically correct new principle followed by years of constant pioneering refinement.

There is an OWEN BUCKET exactly suited to handle your particular job faster, more economically and longer with less maintenance cost.

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WATERLOO, IOWA

Northwest Meeting Of Civil Engineers

Power, construction, waterways, air transport, engineering economics, and other subjects affecting the northwest were the themes of the Summer Convention of the American Society of Civil Engineers held last month in Seattle, Wash. More than 500 members attended the technical division meetings, general sessions, and social functions.

An improvement in bidding forms was urged on the engineers as a means of holding down construction costs. "The wording and manner of presenting a bid form have an important significance in determining the ultimate cost of the job to the owner and assuring a reasonable profit to the contractor," said R. B. Rothschild, Jr., of the Hass & Rothschild contracting firm of San Francisco. He pointed out that when the contractor prepares a bid in which the burden of unforeseen elements is on him, he naturally will include a figure to cover them—so that the owner will pay not only for contingencies which do occur, but also for some which do not. "The intelligent answer," Mr. Rothschild continued, "would seem to be to set up a manner of bidding which allows the contractor to be paid just for contingencies which do occur and can be evaluated, but not for those which are purely problematic."

Mr. Rothschild favors the unit-bid form as the most expedient way of arriving at a solution on heavy construction and other types of projects where the hazards are of great consequence. He pointed out that in the past, many unit-bid forms have lost sight of their purpose and become merely mathematical nightmares for the contractor, instead of reducing his risk.

The civil engineers also discussed the matter of cooperation in the design of airports and aircraft. It was urged that those responsible come together to prevent the obsolescence of new airports, and at the same time to keep airport design from holding up the construction of modern aircraft. It was also urged that highway bridges be designed more realistically with particular relation to the live loads which they must support, in the face of the rapid growth in number and weight of trucks using the highways.

The role of the engineering profession in administering America's world-recovery program was stressed. It was pointed out that the engineering pro-

fession has played a vital part in bringing about the high standard of living in America, and that using the engineering profession to its fullest would be the surest road to peace and the best way to assure American taxpayers of their money's worth.

Other subjects discussed at the meeting were: the Ross Dam project on the Skagit River in Washington, where concrete was mixed and poured—using the care and delicacy of a fine chef; the planned construction of two additional San Francisco Bay toll crossings; a proposed procedure for allocating costs of multiple-purpose water developments; the possible economic development of up to 27,000,000 kilowatts of hydroelectric power in the Columbia River basin; a proposed floating tunnel to link Seattle with the Olympic Peninsula across Puget Sound; the need for the Federal government to establish a management approach to programming, timing, and financing the development of hydroelectric power in the northwest; the proposed establishment of a Federal government corporation to handle financing of the power and other projects on the Columbia River and other waterways; and the study of waves to determine the characteristics which waterfront structures must be designed to withstand.

Aggregate Washers

An improved log washer for scrubbing coarse aggregates is announced by the Eagle Iron Works, 129 Holcomb Ave., Des Moines, Iowa. The semi-steel renewable shoes are mounted on steel feet attached to logs welded from angle steel to give a tip-to-tip diameter of 36 inches. The wearing surfaces are provided with corrugated sections designed to deliver a severe scrubbing action.

Among the features claimed for the Eagle log washers are bottom wash-water inlets, hardened gears, Hydrotex marine bearings at the lower end, and Timken roller bearings at the upper end.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 86.

Emergency First-Aid Kits

First-aid kits of several kinds are prepared by the Medical Supply Co., 1027 W. State St., Rockford, Ill. Literature describing these kits, and the supplies in them, is now being distributed by the company. The prepared kits in-

clude the No. 5, designed to meet the needs of field shops; burn spray kits for use where a fire hazard is present; snake-bite kits; I. C. C.-approved kits for use in trucks, cars, and other automotive-type equipment; and others.

The data sheets illustrate each of these kits showing the kinds and ar-

rangements of the supplies in them. A tabulated list tells the exact quantity and size of each supply item of any particular kit. The sheets also contain helpful first-aid advice.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 18.

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... a man-saver and money-maker for all producers of sand, gravel, crushed stone, cinders and other abrasive materials.

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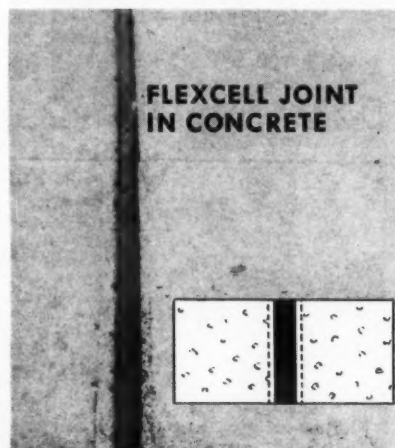
Elkhart 6, Ind.

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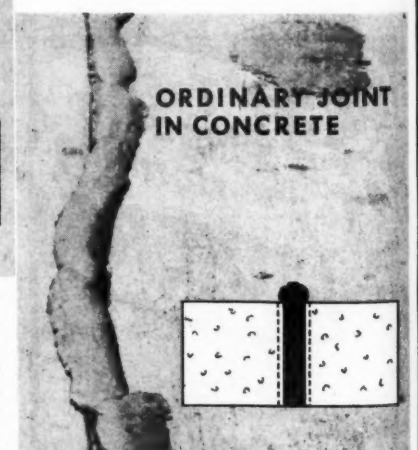
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**LASTING
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CHECK THESE POINTS OF FLEXCELL SUPERIORITY

- ✓ Will not extrude under compression by adjacent concrete slabs—millions of tiny air cells permit compression without displacement.
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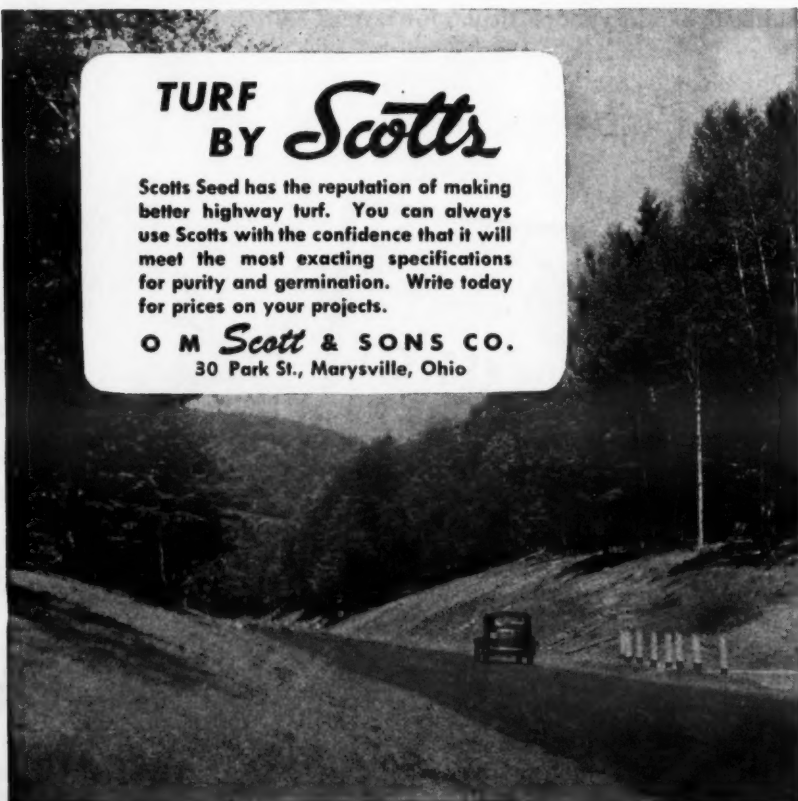
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O M Scott & SONS CO.
30 Park St., Marysville, Ohio



Fast Crew Paves Urban Expressway

(Continued from page 6)

blessed by the Acree boys—W. E. Acree and his brother. W. E. Acree was the Paving Superintendent, and both brothers are well known throughout this region for the smooth-riding qualities which characterize slabs on which they work.

Acree used 8-inch Blaw-Knox steel road forms to hold the concrete, and had about 6,000 road-feet available on the job. These forms were drilled on 36-inch centers to permit steel dowel bars to be inserted along the longitudinal joints made by the outside form.

In general, forms were laid 600 to 800 feet ahead of paving equipment, but sometimes over 1,000 feet was placed. Short sections between overpasses made good planning absolutely necessary. This job in no way resembled the usual run of straight-line highway paving, which extends sometimes for miles without a break.

Out of a total concrete gang of 45 men, about 12 men set forms, staked them down, and aligned them. They stripped forms from the previous day's pour, using shop-made jack pin pullers, and moved them up on a flat-rack truck. With the sub-base previously laid to exact grade, no form trench was necessary and no tamping was required. Any hollow under the base of a steel form was filled with just a little of the loose blot-course gravel.

Form pins, and also the steel pins which held the expansion joints down, punctured the asphalt seal on the sub-base—a feature of the Houston Expressway job. But they did not extend down to disturb the asphalt seal over the subgrade. When this question arose early in the project, engineers did not consider these small punctures harmful enough to the structure to justify a contract extra with added expense—heavy, cumbersome frames to support the joints.

Pavement Joints Set

Design of the expressway pavement called for a ½-inch wood expansion joint every 20 feet, with the wood set about an inch below the top of concrete. After the slab had hardened, this surface slot was filled with hot rubberized-asphalt joint filler.

The expansion joints were made up on a jig in a central yard and hauled to the project. The untreated cypress boards arrived in 12-foot 3-inch and 12-foot 6-inch lengths, and in 3 and 4-inch widths. Four pieces were assembled and held together by Star Lugs on 20-inch centers, raised 2½ inches off the ground level. A transverse piece of steel reinforcement was fastened across the Star Lug protuberances to tie in with the steel reinforcing mesh and keep the Lug in proper alignment.

These joints were then set in place every 20 feet, and covered with a metal cap before being staked down to the sub-base. Later, after the concrete was placed, these joints received special string-line treatment to bring them

back to perfect alignment.

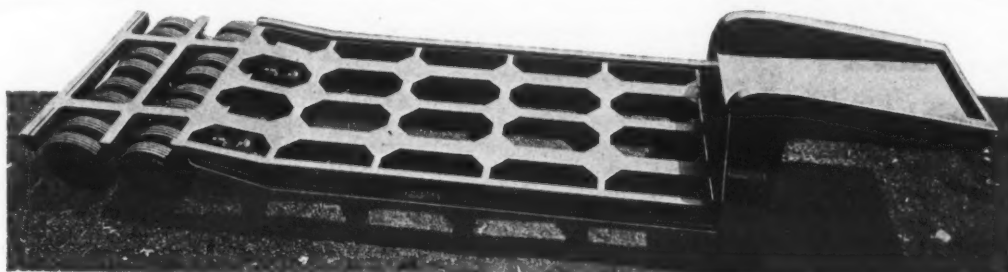
Steel dowels ½ x 36 inches were also tied onto one of the 6 x 12 x ¾-inch mesh reinforcing mats along the side of the pour, so these would be ready for the center joint of the wide pour. The same-sized dowel bars were inserted through the drilled holes in the steel

forms, later on during the pour, to tie the two paving strips together.

The longitudinal center joint in the wide slabs was formed by these dowel bars, and by the Kies cut-and-cover method of weakened-plane joint construction. A steel knife on the front end of the Longitudinal Finisher cut this

joint, and a feeder tube on the back frame in the center dripped Hunt Process solution into the groove. Finishers then worked over the joint, and soon after the pour the faint crack appeared on the surface.

Before any paving was done, the
(Continued on next page)



Hughes Trailers Can Stand the Stress

Heavy loads and rough roads are tough on trailers. That's why Hughes trailers have a rugged gooseneck with wide, deep flange main beams running the full length of the trailer. The reinforced cross members and outriggers are channel sections. The entire frame is of electrically welded construction and oscillating axles take the twist out of rough hauling.

All Hughes trailers can be obtained in either drop or straight deck, semi or full. 15 to 100-ton capacity. See your nearest distributor or write for our catalog.

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The Foote Kinetic Mixer is portable—rubber-tire mounted. It is easily operated. It's fast and saves time. Mixes right on the job. Delivers 3 cu. ft. in 30 seconds. New mixing principle assures thorough mix. Ask for folder K-100 and name of representative nearest you.

THE FOOTE COMPANY, INC.

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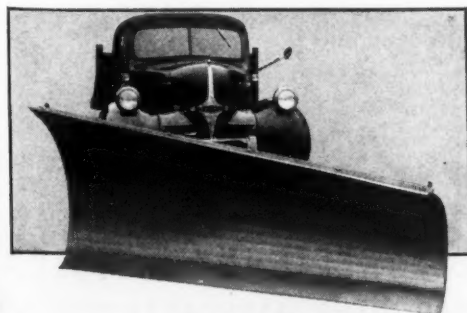
1916 State Street

Nunda, New York

(Also see page 58)



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Gledhill standard, one-way plow with 10' cutting edge. Interchangeable with V-Model. Spring-type flareboard—additional height—better vision.

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Contractors and Engineers Monthly
470 4th Ave., New York 16, N. Y.

Fast Crew Paves Urban Expressway

(Continued from preceding page)

expansion joints were set and staked, a supply of steel dowel bars was put on the front end of the spreader, and the mesh reinforcing mats were brought in and distributed along the side of the pavement site.

Pouring Concrete

A new Koehring 34-E Twinbatch paver mixed concrete. State specifications required this paver and its skip to move along on a planked roadway over the sub-base, so that its movement would not disturb the asphalt seal.

The Koehring Twinbatch machine was equipped with a 35-foot boom and a dual-gate dump bucket. It has fully automatic operation from the moment the skip is raised in the air. Mixing water came in by way of a Ford tank truck which hauled about 1,000 gallons. The water was then transferred to a tank trailer pulled along behind the 34-E machine. A small 2½-inch Gorman-Rupp centrifugal pump on this tank transferred water and fed the paver.

After the paver was charged with the dry concrete materials, and water entered the mix, a mixing time of 50 seconds per batch delivered good Class A concrete at an average slump of 1½ inches to the subgrade.

Since the reinforcing mesh had to go in halfway in the slab, the mixer operator laid only slightly more than 4 inches of concrete across the sub-base. A Jaeger-Lakewood concrete spreader was shop-fitted with a steel strike-off screed on its front end. This heavy screed could be raised or lowered by means of a hand winch and cable. The machine moved up the 20 feet between joints and struck off the concrete 4 inches high. Six men around the spreader kept the concrete shoveled against the forms and against the expansion joints.

The Jaeger-Lakewood machine then quickly moved back, and a fast Negro gang set the two 20 x 12-foot 3-inch mats of steel mesh reinforcement. The spark plug of this gang was a small, cheerful Negro named Harvey Clemons.

Harvey and three of the other boys carried the mat on a run over the fresh concrete and slapped it down. Quickly they stomped it in place, and Harvey Clemons made two wire ties on the Star Lugs. By then the 34-E was ready with another batch. The operator dumped two batches in close, on the mat just placed. By that time the other section of mat was in, Harvey had made the ties, and was headed on a dead run up the line of mats to tie in a few more dowel bars.

Mesh reinforcement was placed without the loss of effective paver time, due largely to this energetic and well trained colored crew. When asked the reason for all this efficiency, Harvey said, "I been working for Mister Acree for 15 years, and I don't like to dissatisfy him".

After the reinforcing mats were in, the rest of the slab was placed by the paver bucket, and the first strike-off was made by the Jaeger-Lakewood double-screed finishing machine.

Concrete Finishing

The final mechanical finish on the concrete surface was done by a Koehring Longitudinal Finisher. This machine crawled along, carrying a slight excess material across and forward, and generally struck the concrete down to its final limits.

Two hand finishers then worked the surface with Heltzel steel straight-edges. One of the men who handled a straight-edge is Acree's brother. Over a period of many years, these men have concluded that the time to finish the

surface of a concrete slab is while it is still wet. They straight-edged the slab crosswise and diagonally, until they worked it down to finish grade.


Excessive bleeding and laitance were controlled by the dry mix, and the straight-edges did not float much fine material to the surface. What material did work up was carried ahead by these two men as they dragged a rubber hose across the concrete surface.

At this point the metal caps and pins were stripped from the expansion joints by a pair of finishers working from a joint bridge. Each joint was then realigned by stretching a tight string line at the correct point on the form, and barring the top of the wood to exact alignment. All the joints were given this treatment.

Dummy wood strips were then inserted to form the 1-inch-deep groove over the wood, and the concrete was finished with edging tools. These strips stayed in place until the concrete slab had taken a firm set.

(Concluded on next page)

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Fast, rugged, high-powered, flexible, easy to handle... Van Dorn Heavy-Duty Portable Electric Drills drive augers through heavy timbers and planking; drill in all kinds of metals and compositions; drive Hole Saws for cutting clean, round holes up to 3½" diameter. Available in capacities from ¼" to 1¼" in steel. Ask your nearest Van Dorn Distributor or write for our free catalog to: The Van Dorn Electric Tool Co., 787 Joppa Road, Towson 4, Md.

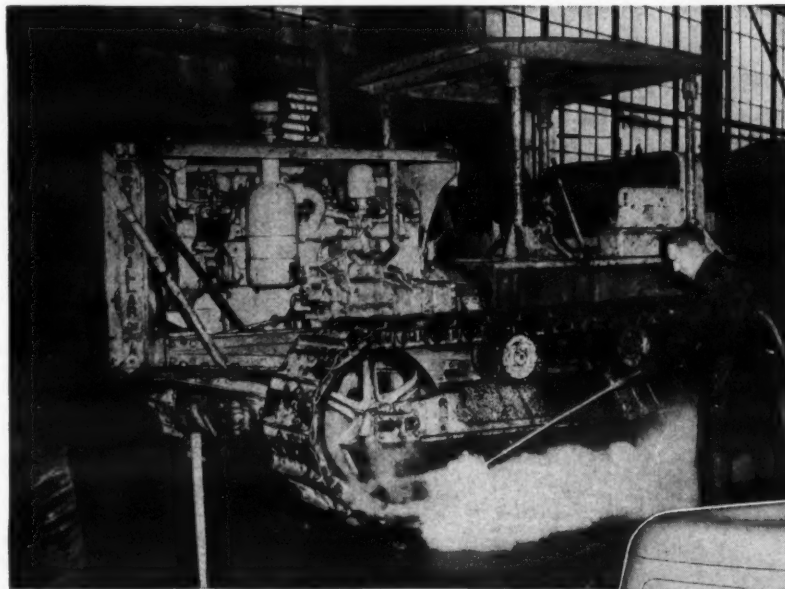
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Compact... portable... easy to operate... Hypressure Jenny can be used on the job or in the shop. In less than a minute from a cold start, Hypressure Jenny's blast of steam, hot water and cleaning compound, loosens and flushes away almost instantly, mud, muck, dirt, and grease from construction equipment.

When used to clean machinery before repairs, Hypressure Jenny saves up to 40% of your mechanics' time which otherwise would be lost wiping oil and grease from tools and equipment. Besides increasing the efficiency of both men and machines, Hypressure Jenny steam cleaning exposes lubrication fittings and grease cups, and removes sand and grit which otherwise might enter bearings... reveals damaged or worn parts permitting repairs before service failures occur... eliminates fire hazards due to the handling of volatile cleaning fluids.

Hypressure Jenny is fast... 8 to 10 times faster than hand cleaning... thorough... economical... and so safe and easy to use that ordinary labor can operate it.

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HYPRESSURE JENNY DIVISION
HOMESTEAD VALVE MANUFACTURING CO.
P. O. BOX 30 CORAOPOLIS, PA.

Curb Work

A 6-inch raised curb was then formed and poured monolithic with the slab. This work was done with a high degree of efficiency. Sections of 2x6-inch channel-iron forms 10 feet long were lined up on top of the main Blaw-Knox road forms, fastened together with a sliding key, and attached to the lower forms by fixed screw clamps. The curb forms then were carefully lined up with the lower forms, and a work gang started bringing in the concrete in wheelbarrows.

Regular concrete from the pour was dumped occasionally outside the form by the paver operator, for use by the curb crew. The curb was formed by shoveling the concrete in from the wheelbarrows. A finisher then set his steel guides from the top of curb forms to the level of the main slab. These guides, about 2 feet apart, permitted him to tamp and to rough in the main body of the curb.

The curving surface of this curb was finished later by the men who dressed the slab. A float finish was applied. The joints received additional dressing, and the slab surface got a final canvas-belt finish made by working a 4-ply canvas belt across the surface in short strokes.

After this and the curb work were done, and the concrete had taken on its initial set, a machine, installed the traffic stripes. Black magnetic iron oxide was used. It was put down in the steel slot of this machine, and worked into the concrete with trowels. It makes a permanent mark which penetrates the concrete about 1/4 inch.

Concrete curing was done by 60-foot rolls of Sisalkraft paper, and by cotton mats. The steel forms were usually stripped in 24 hours. The best day's run on the wide 24-foot 9-inch strips was 850 feet in 9 hours, for a total of 510 cubic yards.

Pours were made in exactly the same way on the narrower strips.

Batch-Plant Set-Up

Concrete materials for paving aggregates were furnished and batched by the W. D. Haden Co. A special plant for Brown & Root was set up adjacent to the firm's own commercial plant near the center of the job.

Sand and aggregates came in by railroad from the Texas Construction Materials Co. plant at Columbus, Texas, and were stockpiled between the railroad tracks and a custom-built Smith

aggregate batcher. This batching plant had three compartments, totaling 60 tons of capacity, and was equipped with a set of Johnson 3-beam scales. Only two of the compartments were used for this work.

Lone Star bulk cement was unloaded by a Butler Carscoop, and stored in a 300-barrel Blaw-Knox cement silo. The railroad spur which served the cement silo is on the other side of the yard from that which served the aggregate bins.

From 5 to 10 Ford, Chevrolet, and Dodge batch trucks were used on Brown & Root's job. They backed in under the aggregate plant, got one full batch of aggregate at a time, and then drove through under the cement batcher to pick up their two loads of cement.

The concrete mix which was generally used on the project is known as Mix P-48, and was proportioned as follows for a 1.5-cubic-yard batch:

Cement	741 lbs.
Water	48.5 gals.
Sand	1,932 lbs.
Gravel aggregate	2,961 lbs.

Specifications on gravel aggregates for this mix were as follows:

Retained on 3-inch screen	0
Retained on 2-inch screen	0-20
Retained on 1/4-inch screen	95-100

Specifications for sand for this mix called for the following screen tolerances:

Retained on 3/4-inch screen	0
Retained on 1/2-inch screen	0-5
Retained on No. 20 screen	15-50
Retained on No. 100 screen	85-100

Personnel

The Houston Urban Expressway was designed and is being administered under the general supervision of State Highway Engineer D. C. Greer and W. J. Van London, Engineer-Manager. J. C. Dingwall and H. W. Elder were Urban Planning Engineers, and F. M. Delk was the Resident Engineer.

For Brown & Root, Inc., the big job was under the general supervision of Vice President W. A. Woolsey, with Gordon Thompson as Chief Estimator.

General Superintendent Howard Payne was assisted in the field by Roy Hughes, Excavation Superintendent; J. E. Quillan, Electrical Superintendent, and J. E. "Cotton" Thompson, Sr., Bridge Superintendent. W. E. Acree was in charge of paving, and Jimmie Winter served as Office Engineer.

F. D. Salmons was the Chief Engineer on surveying, layout, and compu-

tations. His department was a quite unusual one. It marked one of the first jobs where the contractor, according to specifications, performed most of the engineering staking on the project.

Data on Crawler Tracks

A line of track equipment and replacement tracks is described in a bulletin issued by the Kuchar Track Wheel Co., 1810 W. 119th St., Chicago 43, Ill. This folder provides information on the Kuchar line of track wagons, track trailers, replacement tracks for Athey truss wheels, Kuchar track wheels, and

replacement tracks for Athey Forged-Trak wheels.

The folder lists complete specifications for six models of track wheels, pointing out their capacities, dimensions, distance between center lines, weight, diameter and length of the main bearings, and other pertinent information. Line drawings illustrate the use of the Kuchar track wheel with various types of equipment, and a photograph shows the actual details of the unit.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 24.



with PLASTIC ROCK!

You can quickly and profitably trowel a smooth, resilient, long-lived surfacing right over that old concrete or wood floor.

Plastic Rock comes complete, packed in barrels. Nothing more to buy. No application "formula" to confuse. Simply mix and trowel right over old floor; average depth one-half inch. Old floor Saturday is a new floor Monday. Plastic Rock is absolutely spark-proof, skid-safe even when wet, dustless, silent. Feels like cork under foot. Cannot splinter,

crack, crumble, curl or loosen. Also patches concrete to a perfect feather edge. Heavy loads on steel wheels actually improve it. Five-year-old floors show no wear. Used by largest railroads and industries in America. Over 600 contractors have found Plastic Rock a good-will builder and profit source. No special equipment needed. Not for home use.

Ask for comprehensive and convincing Report 220-C-8

UNITED LABORATORIES, INC.
16815 EUCLID AVENUE • CLEVELAND 12, OHIO
In Canada — STORR MFG. COMPANY, Weston, Ontario
Representatives everywhere, including foreign countries

For Faster LIFTING For Safer LOWERING SIMPLEX

RATCHET LOWERING JACKS

For Contractors, Bridge and Road-Builders, Truckers, Operators of Heavy Equipment

Use these single acting jacks for safe, sure work in lifting, lowering, pushing or pulling. Double lever sockets speed work in cramped quarters and in angular lifting. All models will lift full capacity on the toe or on the cap—a feature that only Simplex can give you.

Available in 10 models with capacities ranging from 5 to 35 tons, and lift from 7 to 18 inches. All have two-way standard lever socket except three largest models; these are available with an of three types of sockets. Delivered with level included.

For full information, write for Bulletin: Industrial 48.

NO. 22
10 TON CAP.

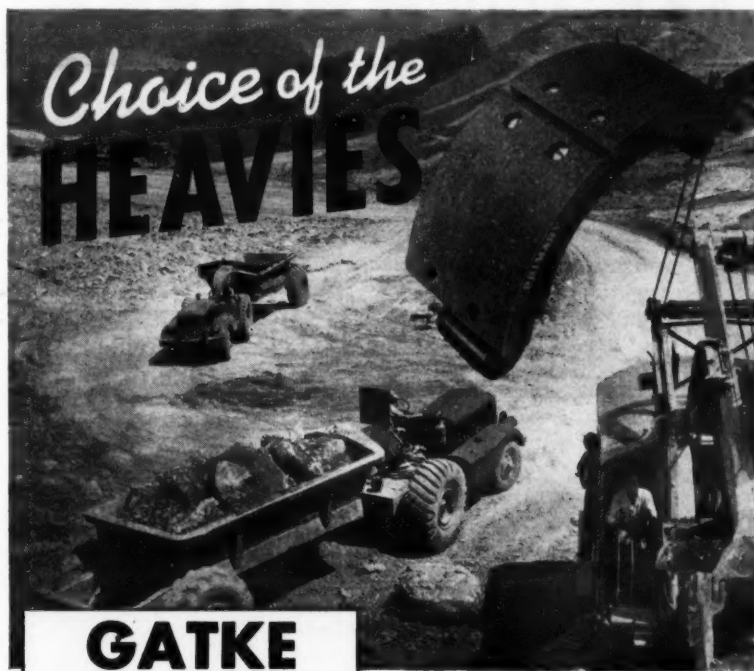


SIMPLEX HYDRAULIC JACKS

Available in eight models to handle from 3 to 100 tons — tested to 100% overload. Write for Bulletin HJ-47.

Simplex LEVER - SCREW - HYDRAULIC Jacks

TEMPLETON, KENLY & CO.
1006 South Central Avenue, Chicago 44, Illinois



GATKE Custom-Bilt BRAKE BLOCKS

for
Trucks - Tractors
Trailers - Buses
Cars and
Equipment
of all kinds.

For extra performance with Greater Safety and less maintenance cost you need GATKE CUSTOM-BILT Brake Blocks.

They have smooth, non-grabbing action that prolongs tire life. Extra Holding Power safely maintained at all service temperatures. Long wear life that keeps brakes fit for the road with minimum service.

RESULTS TALK. Use GATKE CUSTOM-BILT Brake Blocks for your next five relines and compare.

Ask your GATKE Jobber or write.

Gatke
CORPORATION

224 N. La Salle St.
Chicago 1, Illinois

Two New Hydraulic Power Units Designed

Two new hydraulic power units are announced by the Hydro-Power Division of The Hydraulic Press Mfg. Co., Mount Gilead, Ohio. The Paul Bunyan, Jr., is said to be capable of supplying 3 gallons of oil per minute at 1,000 psi.

The Paul Bunyan, Jr., is a portable model powered by an air-cooled Wis-

consin gasoline engine. The precision-built gear pump is mounted integrally with the operating valve. The check and relief valves are built in the main valve body. Permanent suction and return lines are installed between the pump and tank. The tank has an oil-level gage and air-filter breather cap. According to the manufacturer, only two operating-line connections need be made to ready the unit for service.

PNEUMATIC ROLLING WITHOUT GAPS



ROLL 60" OR 84" PATHS ON ONE PASS OF THE ROLLER

- ★ 13 wheel 84"-full coverage rolling width
- ★ 9 wheel 60"-full coverage rolling width
- ★ For compacting base and surface courses
- ★ Oscillating axles assure uniform compacting and longer tire life
- ★ Ground pressure variable - depends on weight of ballast
- ★ Roller bearing (2) in each wheel

Features INCLUDE:

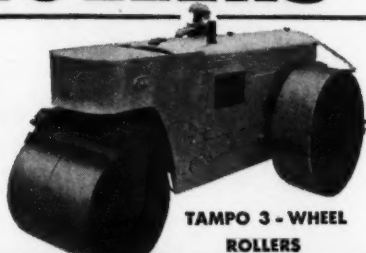
- ★ STAGGERED WHEELS
- ★ OSCILLATING AXLES
- ★ UNDERSLUNG CHASSIS



PNEUMATIC TIRED ROLLERS



TAMPO SHEEPSFOOT TAMPING ROLLERS



TAMPO 3-WHEEL ROLLERS

TAMPO MANUFACTURING COMPANY

1146 W. LAUREL - TELEPHONE P-9173 - SAN ANTONIO 6, TEXAS

A New Line of Portable Cement Bins

TYPE "M" a complete single compartment bulk cement storage and batching plant designed for easy portability. Made with 2 or 3 sections. This efficient, low cost plant eliminates all the inconvenience and waste from handling bag cement. A selection of weighing Cemeters provides accurate batching of cement to batch trucks and truck mixers. Write for Bulletin M.

BINS	CAPACITY	
	CUBIC YARDS	BARRELS OF CEMENT
M-1	29	172 to 194
M-2	45	270 to 304
M-3	73	437 to 492

TYPE "L" LINE

For Larger Sizes, 540 to 1000 bbls.

Write for Bulletin L



Type M3-73 Cu. yd. Cement Plant

ERIE AGGREGATE PLANTS

Erie Steel Construction Co. 288 Geist Rd., Erie, Pa.

BUCKETS • AGGREGATORS • PORTABLE CONCRETE PLANTS

Cubline power units are electrically powered and are recommended by the company for the application of hydraulics in forming, bending, straightening, pressing, lifting, pulling, and lowering operations. Each unit consists of a 35-gallon oil-storage reservoir with foot mountings, electric motor,

1,000-psi gear pump, relief valve, coupling, pipe and fittings, and suction hose and clamps. The Cubline consists of three models rated at 6, 10, and 15 gpm at 1,000 psi.

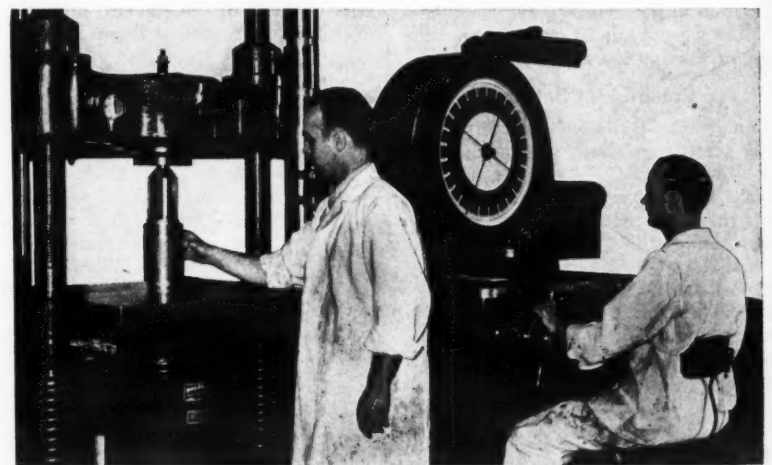
Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 31.



Mall 3 h.p. Hi-Kik Vibrator Variable Speeds to 7000 frequencies

Write for FREE folder Mall Concrete Vibrators and name of nearest dealer.

MALL TOOL COMPANY, 7743 South Chicago Ave., Chicago 19, Ill.



NOSTRIP Testing Engineers

running stability tests on bituminous mixtures

Standard and accepted laboratory tests show the benefits of using NOSTRIP. Official public works agencies have tested and approved this additive for many years.

NOSTRIP, the all-year additive for tar and asphalt, will give you a more durable paving job, even in the wettest weather. NOSTRIP enables you to coat wet aggregate with liquid bituminous materials and greatly increases the resistance to stripping of any bituminous films.

Here are six important reasons NOSTRIP will give you a better, longer lasting surface.

1. AGGREGATE CAN BE WET OR DRY IN SURFACE TREATMENT, SEAL AND TACK-COATING, COLD PLANT-MIX, AND MIXED-IN-PLACE CONSTRUCTION.
2. NO DELAYS DUE TO RAINSTORMS.
3. HALVES THE BLADING AND MIXING TIME FOR ROAD-MIX.
4. TESTED AND APPROVED BY OFFICIAL RESEARCH AUTHORITIES.
5. AUTHORIZED FOR FEDERAL AID ROADS.
6. CAN BE ADDED IN THE FIELD OR AT THE REFINERY.

Street and highway officials know it pays to demand a proven and approved anti-stripping additive with years of successful experience. Write us for specific information on how NOSTRIP can help you.

NOSTRIP DIVISION, MAGUIRE INDUSTRIES, INC.

122 East 42nd Street, New York 17, N. Y.

Equipment Distributor Doings

Headquarters Renovated By Hartford, Conn., Dealer

The Parker-Danner Co. has moved into its recently renovated headquarters at 40 Midland St. in Hartford, Conn. This building houses the Parker-Danner offices and parts and service departments. It is the Connecticut and western Massachusetts headquarters of the company, and is under the management of George Rowen.

This branch handles Koehring equipment, Le Roi compressors and engines, Cleveland rock drills, Gorman-Rupp pumps, Clyde hoists and derricks, Master vibrators, Schield-Bantam shovels and cranes, Broderick-Bascomb wire rope, and other construction equipment and machinery.

Dealerships Available For Johnson Finisher

The Madsen Iron Works announces that it has acquired the patents of the Johnson mechanical float finisher, which it previously manufactured under a license agreement in eleven western states. The Johnson finisher is for use in finishing concrete pavements. It is designed to provide a smooth riding surface, and to reduce subsidence occurring after the finishing has been completed.

Madsen now plans to increase its dealer organization to cover the entire United States. Dealers interested in the line of Johnson finishers should address their communications to the Madsen Iron Works, 5631 Bickett St., Huntington Park, Calif.

GM Diesel Dealer in Mich.

The Earle Equipment Co. of Detroit, Mich., has been named distributor for Series 71 diesel engines by the Detroit Diesel Engine Division of the General Motors Corp. Founded 39 years ago by Horatio S. Earle, Michigan's first Highway Commissioner, this firm handles over twenty lines of contractors' equipment.

John R. Earle is General Manager, and Jack Deakins is Sales Engineer of the diesel sales section of the company. In addition to sales and service outlets in Detroit, sales representatives are maintained in other Michigan cities. A. S. Richardson and R. S. Reeves are in Grand Rapids; M. M. Hughes is in Kalamazoo; D. S. Kurtz is in Monroe; S. G. Heustis is in Cadillac; and C. A. Cornell and Elden Livingston are in Alpena.

Barco Dealer Changes

The Barco Mfg. Co. of Chicago has announced several changes in the alignment of its distributors. The territory of Koontz Equipment Corp. of Pittsburgh, exclusive distributor of Barco gasoline hammers in western

Pennsylvania, has been extended to include northeastern Ohio and the Cleveland area. Highway Equipment Co., Cincinnati, Ohio, has been appointed exclusive distributor in southwestern Ohio and sections of Kentucky and Indiana adjacent to Cincinnati.

The Construction Machinery & Supply Co., Toledo, will be sole Barco distributor in northwestern Ohio. Flesch-Miller Tractor Co., Lawrence, Ind., has been granted exclusive rights in that state. And Loveland Equipment Co. of Syracuse will cover the central New York area.

Flying Dealers

Distance means little to "The Flying Fabicks" of St. Louis. These Missourians feel that conventional travel—with its headaches of reservations, schedules, et al—just isn't the way to cover properly the area which they serve.

The John Fabick Tractor Co.'s air fleet consists of a twin-engine Beech, five single-engine Beechcraft, and three



"The Flying Fabicks" pause for breath at the Lorain airport. Left to right: Francis Fabick, Secretary-Treasurer of the John Fabick Tractor Co.; M. B. Garber, Assistant General Sales Manager of The Thew Shovel Co.; Bill Williamson, Thew's St. Louis District Manager; G. E. McNeill, pilot; and Earl W. Kubel, Fabick machine supervisor.

helicopters. The Fabicks frequently fly on commercial missions throughout the United States, Canada, and Alaska. And as distributor for The Thew Shovel

Co., they frequently fly to Lorain and Elyria, Ohio.

On their latest hop to Lorain, the
(Continued on next page)



America's Largest Builder
of Material Handling Buckets

SHOVEL PULL SHOVEL DRAGLINE CLAMSHELL

FRONTS, BOTTOMS, SCOOPS and TEETH shown in color on buckets are 14% manganese steel developing tensile strength up to 120,000 p.s.i. This high percentage manganese steel gives tough, rugged strength for hard service and allows wide set corner teeth for easy entrance in digging. Volume production methods enable us to build a better bucket with amazing economies in manufacturing.

Experience Counts. See your shovel man or equipment dealer about PMCO Buckets and Dippers.



DRAGLINE

Perforated Sizes 3/4 yd. to 2 yds. 20%-40% lighter than other makes.
Solid Sizes 3/4 yd. to 2 yds.
Mine Stripping Sizes 2 yds. to 9 yds



PULL SHOVEL
Outside Cutter Widths:
21", 26", 31", 36", 39"



CLAMSHELL
Sizes 3/4, 1, 1 1/2, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100



SHOVEL
Sizes 3/4 yd. to 18 yds.

On the 3/4 yd. and 1 yd. Shovel, Pull Shovel, and Dragline Buckets, all teeth are interchangeable—a great advantage to operators.

"Quality Since 1880"

PETTIBONE MULLIKEN CORP.

CHICAGO 51,
U. S. A.

WE OPERATE THE LARGEST AND MOST COMPLETE MANGANESE STEEL FOUNDRY IN THE UNITED STATES

MILITARY TRUCK PARTS



Every part for every G.I. type vehicle from jeep to 20-ton prime mover 6x6, 40% to 80% below list.

COMPLETE STOCK OF PARTS FOR STANDARD CONVENTIONAL CARS AND TRUCKS

New - used - rebuilt Truck operators, dealers, garagemen, learn about amazing low prices.

SEND FOR FREE CATALOG

NORTHWESTERN AUTO PARTS CO.
811 NORTH SEVENTH STREET MINNEAPOLIS, MINN.

Distributor Doings

(Continued from preceding page)

Fabicks took off from St. Louis at 8:00 a.m., stopped at Salem, Ill., and Findlay, Ohio, and arrived at 11:30 in the morning. After lunch and full business sessions, they were back in St. Louis in time for dinner. Time marches on.

N. Y. Dealer for Carter

T. Southworth Tractor & Machinery Co., Inc., Glenwood Road, Menands, Albany 4, N. Y., is a new distributor for the Ralph B. Carter Co. of Hackensack, N. J. Southworth will handle the complete line of Humdinger pumps, including both self-priming centrifugal and diaphragm pumps. This distributorship includes the New York counties of Fulton, Hamilton, Saratoga, Washing-

ton, Warren, Albany, Columbia, Rensselaer, Delaware, Greene, Montgomery, Schenectady, and Schoharie. It also includes Bennington County in Vermont.

Distributorships Open

For Vibratory Equipment

The Vibro-Plus Corp. of New York City announces that it has several distributorships open throughout the United States for its line of vibratory equipment. Among the units made by Vibro-Plus are gasoline, air, and electric concrete vibrators; a vibratory soil compactor; vibrating screens and hopper feeders; industrial vibrators and others.

Interested dealers should write to Vibro-Plus at 243 W. 55th St., New York 19, N.Y.

B-G Dealer in the West

Fuchs-Clayton Machinery Co. has been named a representative of the

Barber-Greene Co. in Nebraska and the western tier of counties in Iowa. Barber-Greene products handled by the firm include bituminous mixing and paving machines, portable bulk-material loaders, snow loaders, ditchers, and portable and permanent belt conveyors. Fuchs-Clayton will provide complete facilities for sales, service, and repairs. Shop personnel are factory-trained.

William A. Clayton, Vice President and General Manager of the firm, is a Director of the Associated Equipment Distributors of America, Inc.; A. A. Fuchs, Treasurer, is a Past President of the AED.

Open House in Oklahoma

Completion of the first step in its long-range building program was the occasion for an open-house party held by The Boardman Co. of Oklahoma City, Okla. The program includes the complete remodeling of all existing facilities and construction of a new

(Concluded on next page)

Built to Cut Costs on Heavy Duty Air Tool Operations...

DIXON quality in Air Hammer Couplings assures definite savings on rock drilling and other heavy-duty air tool jobs... longer service life through superior strength and durability; greater efficiency through elimination of leaks and pressure losses; lower hose replacement costs through protection to hose ends.



"G J-BOSS"
AIR HAMMER COUPLING

Ground joint construction—no worn or mislaid washers to replace. Built for heavy duty and hard wear. Furnished with strong "Boss" Interlocking Clamp. Large wing nut facilitates connecting and disconnecting. Compact and heavy types. Cadmium plated—rustproof. For washer style, specify "Boss" Air Hammer Couplings.



"DIXON"
AIR HAMMER COUPLING

Washer style. Efficient, durable, inexpensive. Steel stem has deep, smoothly finished corrugations. Rugged malleable iron clamp has dual gripping ridges on inner surface. Compact and heavy types. Cadmium plated—rustproof. Also available in ground joint construction—specify "G-J-Dixon" Air Hammer Couplings.

Stocked by Manufacturers and Jobbers of Mechanical Rubber Goods.

IF IT'S A **DIXON** PRODUCT

IT'S DEPENDABLE

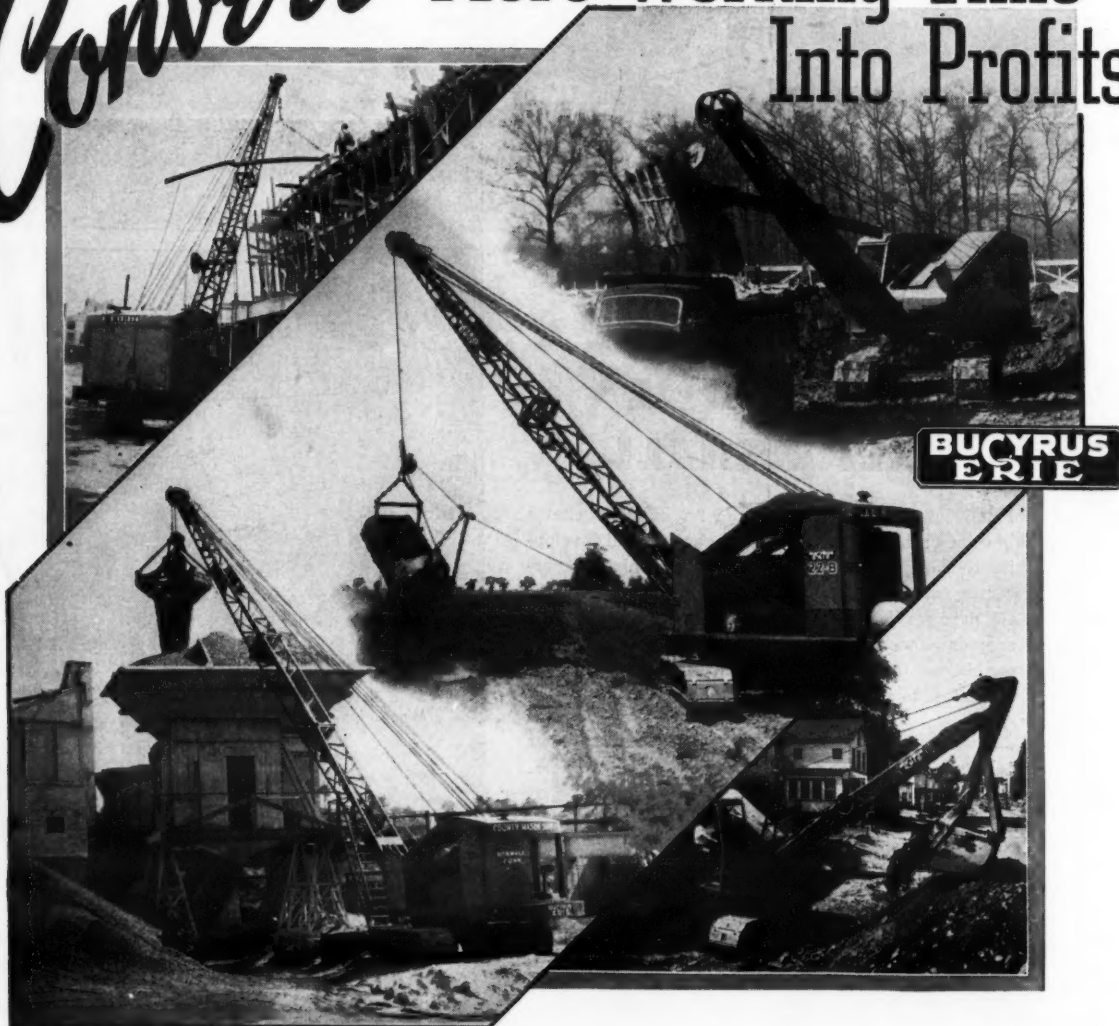
DIXON
VALVE & COUPLING CO.
Main Office and Factory: PHILADELPHIA, PA.
BRANCHES: CHICAGO, BIRMINGHAM, LOS ANGELES, HOUSTON

KEEP INFORMED—

For further information and literature on products described in this issue, turn to pages 17 and 84 for the Red Request Cards. Our Reader Service Department will be glad to help you.

Contractors and Engineers Monthly
470 Fourth Ave.
NEW YORK 16, N. Y.

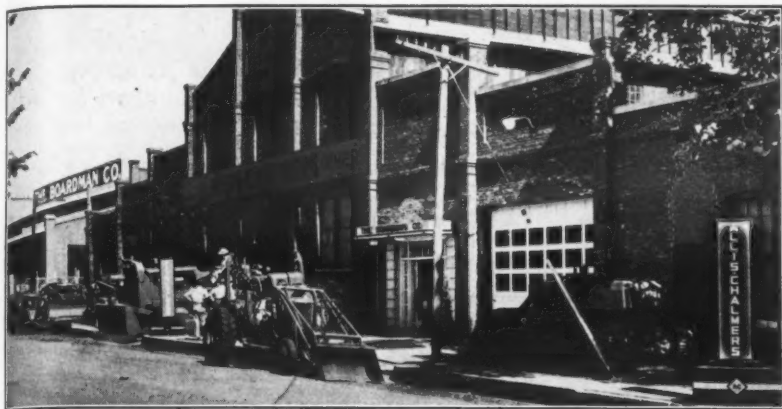
Convert More Working Time Into Profits



Each machine in the Bucyrus-Erie $\frac{3}{8}$ - to $2\frac{1}{2}$ -cu. yd. line is readily convertible to various front ends, and a stalwart performer with any type, packing speed and efficiency into whatever work it handles. Large, cool-running clutches and brakes provide accurate control for precision crane work, deliver power where it counts for shovel operation. Clamshell and dragline jobs take full advantage of Bucyrus-Erie stability and power, producing big output through long hours of operation.

With conversion so easy, and performance so efficient with any front end, there's no need to be satisfied with make-shifts—to make one tool do double duty. Let your Bucyrus-Erie distributor give you more information about these hard-digging, easy-handling machines, and discover for yourself how their convertibility can open up more job opportunities for you.

BUCYRUS-ERIE COMPANY
SOUTH MILWAUKEE . . . WISCONSIN



This is the main entrance to The Boardman Co. plant where an open house and demonstration of road-building machinery was held this past June.

factory building, a new steel warehouse, and a modern engineering building. This year the company celebrates its 36th anniversary in the manufacture of steel products and sale of construction equipment. Boardman is located at 1401 S. W. 11th St.

After a special barbecue luncheon to which all the guests were invited, a field demonstration was held to show off the features of the various equipment on display. Boardman represents the Allis-Chalmers Mfg. Co., Baker Mfg. Co., Gar Wood Industries, Novo Engine Co., and other major manufacturers of construction equipment. The company also does steel-fabrication work.

Parts Dealer for 30 Years

The Northwestern Auto Parts Co. of Minneapolis, Minn., is now marking its 30th year in the business of supplying automotive equipment and accessories. Started as a wrecking yard in 1918, the company now occupies 27,500 square feet divided among four buildings, has a storage yard of 150,000 square feet, and employs over 75 people. The main office is located at 834 N. 7th St., in Minneapolis.

The company features rebuilt motors, transmissions, differentials, and other automotive items. Its slogan, "for that hard-to-get part" is borne out by a glance through its mail-order catalog. In addition to its rebuilding service, the company is also a large-scale designer of automotive accessories, and purchaser of large quantities of surplus parts for military and construction equipment.

Portland Dealer Moves

The Cramer Machinery Co. has moved into its new office and warehouse building located at 1005 S. E. Stark St., in Portland, Oreg. Especially designed for Cramer, the building is a reinforced-concrete structure with a timber trussed roof which eliminates all posts. It measures 100 x 100 and adjoins a 100 x 100 yard and parking space.

Among the lines handled by Cramer are those of Madsen Iron Works, Aeroil Burner Co., Diester Machine Co., C. S. Johnson Co., Buffalo-Springfield Roller Co., Flex-Arm Mfg. Co., Mall Tool Co., Hurst Co., Inc., C. P. Concrete Equipment Co., New Haven Vibrator Co., Flex-Plane Co., Dumperette bodies by Maxon Construction Co., Hayward Co., and others.

B-E Dealer in Reno

Nevada Equipment Service, Inc., of Reno, has been appointed a distributor by the Bucyrus-Erie Co. Located at 1525 E. 4th St., the company will cover the state of Nevada with certain exceptions. The Nevada counties of Elko, White Pine, and Eureka will continue to be served by The Lang Co., Inc., of Salt Lake City, Utah. And the Crook Co. of Los Angeles handles Clark county.

Soulé Equipment Co. of Oakland will continue to serve the northern half of

California except for the area granted to Nevada Equipment Service. This area consists of Plumas and Alpine Counties; Lassen County except for the northwest corner bounded by a line 10 miles south and parallel to U. S. 299; and the eastern portions of Sierra,

Nevada, Placer, and Eldorado Counties bounded on the west by a line running 10 miles west and parallel to U. S. 89. The Bucyrus-Erie District Office for Nevada and California is located at 390 Bayshore Blvd. in San Francisco.

D. C. Dealers for Richkraft

Two distributors in Washington, D. C., have been appointed by the Richkraft Co. of Chicago. They are Martin Wiegand, Inc., 603 S. Capitol St.; and United Clay Products Co., Investment Bldg. The Richkraft line includes concrete-curing compounds and building papers.

Texas Outlet for Lincoln

The Big Three Welding Equipment Co. of Houston and Fort Worth, Texas, has announced the opening of a new branch in Lubbock, Texas. This company handles the complete line of gas and electric-welding equipment manu-

factured by The Lincoln Electric Co. of Cleveland, Ohio. The firm also handles positioners and air tools.

Huber Dealer in Baltimore

The Chesapeake Supply & Equipment Co. has been appointed distributor for Huber rollers, maintainers, graders, etc., in the states of Maryland, Delaware, and the District of Columbia. The company's offices are located at 1211 E. 25th St. in Baltimore. Raymond Stevenson is President of the Chesapeake concern, and Cecil Russell is Vice President.

The company also maintains a showroom, office, warehouse, and shop at 4726-26 Baltimore Ave., Hyattsville, Md., which is managed by G. Kinsey Owens.

The New York State County Highway Superintendents Association will hold its 1948 summer meeting at the Bear Mountain Inn, Bear Mountain, N. Y., on September 7, 8, and 9.

Why pour contracting dollars



*"down
the
drain"?*

ARMCO Perforated Pipe has been widely used under major airports, mainline railways, highways, and wherever else firm, dry subgrades are needed.

Experienced contractors have long known how ARMCO Perforated Pipe helps clinch profitable subdrainage bids. Today the time- and labor-saving features of this pipe are more important than ever.

Savings start the minute you begin to transport ARMCO Pipe to the job site. Although amply strong it is light in weight for easy handling, loading and hauling. Fewer trips and less labor are needed and there is no danger of breakage. A small, unskilled crew can quickly install an Armco subdrainage system. With simple band couplers you speedily join long lengths into a sturdy conduit that

resists shifting soils, frost action and the weight of heavy traffic.

Engineers are usually familiar with Perforated Pipe and accept your bid with confidence. They know it keeps subgrades dry and firm, provides freedom from failure, lowers maintenance expense and protects their investment.

With ARMCO Pipe you are always sure of a first-class job—the kind that lives up to specifications and means future business. Write us for detailed information. Armco Drainage & Metal Products, Inc., 1535 Curtis Street, Middletown, Ohio.

Export: The Armco International Corporation

ARMCO PERFORATED PIPE



Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Contractor Not Liable

On Sub's Debt to Bank

THE PROBLEM: A Government contractor wrote a letter to a bank, stating (1) that it had sublet work to an electric company, and (2) that the company had requested the contractor to instruct the bank that all payments by the contractor to the electric company were to be made payable jointly to that company and the bank.

On the strength of this letter, the bank lent money to the electric company, but the contractor later discontinued payments provided for by the letter, because a materialman who had supplied the subcontractor had a prior claim upon the funds and because the contractor was liable to the materialman. Did the contractor render itself liable to the bank on a theory that the letter bound the contractor to make the stipulated payments?

THE ANSWER: No, decided the Texas Supreme Court. (Citizens National Bank of Brownwood v. Ross Construction Co., 296 S. W. 2d, 593.) Said the court:

"The letter nowhere binds Ross [the contractor] to do anything, but appears rather to be in the nature of a mere recital confirming the existence of stated facts. Accordingly, by discontinuing joint payments to Campbell [the electric company] and the bank when it developed Campbell was in difficulty, Ross was neither breaching any contract nor revoking any promise. . . . Ross made the payments in keeping with Campbell's instructions until one of the latter's creditors who had furnished material on the job asserted a paramount right to the balance which remained due on the subcontracts. . . . Accordingly, Campbell had no further payments . . . due him, and the balance in the construction company's hands was payable not to Campbell but to the materialman, and was properly so applied."

Engineer's Estimate Does Not Bind Subcontractor

THE PROBLEM: S. contracted with a water company to riprap the face of a reservoir dam 2 feet deep with rock and spill. He sublet to W. the loading of the material at a quarry and its hauling to the job. The principal contract provided for payment according to the company engineer's estimates of yardage loaded, but it did not provide that the estimates should be conclusive.

S. spread the material, but did not do it evenly—the depth exceeded 2 feet in some places by as much as 8 inches. This resulted in a 28 per cent variance between the yardage hauled and the engineer's estimate based upon the area blanketed, to an assumed depth of 2 feet. Was W. entitled to recover a balance of compensation, based upon the 7,485 yards actually loaded and hauled, de-

spite the engineer's estimate which indicated 5,622 yards?

THE ANSWER: Yes, declared the Colorado Supreme Court in *Shore v. Wallace*, 186 Pac. 2d 581. The court decided: (1) The engineer's estimate was not binding, because not made conclusive by the terms of the contract. (2) The jury was justified in finding that S. agreed with W. to spread the material evenly so that the yardage measurement at the quarry would correspond with the yardage in place at the dam.

Right to Claim Interest On Delayed Final Payment

THE PROBLEM: A construction contract provided for the payment by a municipality of penalty interest at 4½ per cent for delay in paying vouchers issued to the contractor. Did the clause apply where no vouchers had been issued and the municipality delayed payment under wrongful denial of liability?

THE ANSWER: No. (Spencer, White & Prentiss v. City of New York, 75 N. Y. Supp. 629, affirmed in 271 App. Div. 824, 66 N. Y. Supp. 2d 619; appeal to Court of Appeals denied, 271 App. Div. 926, 67 N. Y. Supp. 2d 701.)

However, the court decided that the contractor was entitled to interest at the legal rate from the date of the final estimate under which the contractor's claims were rejected.

Contract Hauler's Status As Independent Contractor

THE PROBLEM: A hauler was employed by a paving contractor to haul sand and gravel in his own truck from bins to the contractor's concrete mixer. He was paid by the load delivered, did not work regular hours, furnished the gas and oil consumed by his truck, and was not bound to drive the truck himself.

When the hauler was killed, was the contractor liable for workmen's compensation, on the theory that he was an "employee"?

THE ANSWER: No, decided the North Carolina Supreme Court. (Perley v. Ballenger Paving Co., 46 S. E. 2d 298.)

The court applied the generally accepted rule that one is to be regarded as an "independent contractor", and not an employee, when he "contracts to do certain work according to his own judgement and method, without being subject to his employer except as to the result of the work".

When Change in Spex Does Not Release Bond

THE PROBLEM: Is a contractor's or subcontractor's surety released from liability by changes in specifications to which the surety has not assented, where the changes are slight and do not prejudice him?

THE ANSWER: No, decided the United States Circuit Court of Appeals, Ninth Circuit. (Glen Falls Indemnity Co. v. Basich Bros. Const. Co., 165 Fed. 2d 649.)

A contractor on a Government airport facilities job sued on a subcontractors' bond. Upholding judgement in favor of the contractor, the court said:

"As to alleged changes in the specifications, they were made primarily at the request of the Government engineer and with the consent of the subcontractors. They consisted of changes in the maximum size of rock and the method of measurement, and though it be true . . . that a surety will be exonerated where changes are made without its consent and such changes are of such nature as will increase the surety's risk, the changes here are of small significance and in no way affect

the risk of the surety."

Right of War Veterans To Be Restored to Jobs

THE PROBLEM: When inducted into military service, plaintiff, a non-union truck driver, had been employed on a hauling contract that afterwards expired. Under the provisions of the Selective Service Act, requiring reinstatement of veterans to their old or similar standing, was plaintiff entitled to re-employment under a contract that required union labor?

THE ANSWER: No, decided the United States District Court, Middle District of Pennsylvania. (Bozar v. Central Pennsylvania Quarry, Strip & Const. Co., 73 Fed. Supp. 802.)

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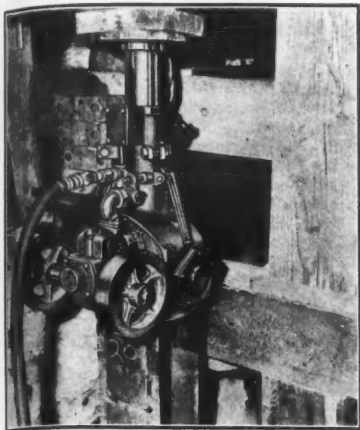
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This Duff-Norton No. 528RX air-motor power jack was recently used to sink piling for a new building foundation. Walter W. Oefflein, Inc., of Milwaukee, Wis., was the contractor who inaugurated this jack application.

Jack Sinks Piling

A new use for the Model No. 528RX air-motor power jack is announced by Duff-Norton Mfg. Co., 2709 Preble Ave., Pittsburgh, Pa. This jack was recently used to sink piling for a new building under construction by Walter W. Oefflein, Inc., of Milwaukee.

The contractor found manual efforts slow and costly, and capable of sinking only a foot of piling per 20 minutes. Replacing manual efforts with the Duff-Norton No. 528RX, the contractor sank the piling at a rate of 2 to 3 feet every 5 minutes, depending upon the density

of the ground being penetrated.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 104.

Line of Trailers

Literature on its line of machinery trailers has been issued by the Beall Pipe & Tank Corp. of 1945 N. Columbia Blvd., Portland 3, Oreg. Featured are the Model BDAM 20-ton dual-axle semi-trailer; the Model B4WN 10 to 15-ton 4-wheel trailer; the D-8 dual-axle 25-ton semi-trailer; the Model B6WM 6-wheel trailer; and the 70-ton 3-axle heavy-duty machinery trailer.

The folder gives a brief description of each of these models, pointing out some of the recommended uses for each trailer, its construction features, and its major specifications and dimensions. Described in detail are the BLTSS dual-axle units, the Beall Calahan dual-axle rear assembly, the solid walking-beam triple-axle assembly, and the demountable trailer frame.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 89.

Nelson to Build New Plant

The Herman Nelson Corp., Moline, Ill., has signed contracts for the erection of a new factory building for the manufacture of its line of heating and ventilating products. The estimated cost of the building is \$200,000 and it will provide 56,000 square feet of additional

working space. Beling Engineering Co. of Moline is handling the mechanical engineering, with erection being done by Priester Construction Co. of Davenport, Iowa.

Two Appointments by Galion

A new district representative for the states of New York, Pennsylvania, and Maryland has been appointed by The

Galion Iron Works & Mfg. Co. He is John C. Painter, who was transferred from a similar position in the south-eastern coastal states. He will make his headquarters in Harrisburg, Pa.

Mr. Painter is succeeded in his former territory by John D. Talbott. Mr. Talbott will cover the states of North and South Carolina, Florida, and Georgia from his office at 1486 Morningside Drive, N. E., Atlanta, Ga.

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Twin Disc Model EH Clutches are available in single, two, or three-plate construction. Sizes range from 14" to 42" ... working capacities from 65 to 875 hp. For complete specifications and engineering information, write for Bulletin 108-D. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).



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- 1—24" Telsmith Gyrasephre crusher
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Felker Mfg. Co.	70	Sterling Motor Truck Co., Inc.	72
Firestone Tire & Rubber Co.	17	Sterling Wheelbarrow Co.	78
Foots Co., Inc.	58, 89	Stow Mfg. Co.	68
		Syntro Co.	42
Gatke Corp.	91		
General Excavator Co.	76	Tampo Mfg. Co.	92
General Wheelbarrow Co.	84	Templeton, Kenly & Co.	91
Gledhill Road Machinery Co.	89	Texas Company	3, 12, 13
GMC Truck & Coach Div.	71	Thew Shovel Co.	5
Godfrey Conveyor Co.	88	Tuthill Spring Co.	77
Griffin Wellpoint Corp.	81	Twin Disc Clutch Co.	97
Gulf Oil Corporation	74		
		Unit Crane & Shovel Corp.	66
Hayward Company	83	United Laboratories, Inc.	91
Heltzel Steel Form & Iron Co.	42		
Hendrix Mfg. Co., Inc.	19	Van Dorn Electric Tool Co.	90
Hercules Steel Products Corp.	27	Viber Co.	22
Hetherington & Berner Inc.	75	Vibro-Plus Corp.	78
Homestead Valve Mfg. Co.	90	Victor Equipment Co.	44
Hose Accessories Co.	74	Vulcan Tool Mfg. Co.	40
Huber Mfg. Co.	24		
Hughes Co., L. J.	89	Walter Motor Truck Co.	65
Hyatt Bearings Division, GMC	60	Warren-Knight Co.	55
Hydro Spreader Corp.	78	Waterloo Foundry Co.	34
		Waukesha Motor Co.	79
Independent Pneumatic Tool Co.	29	Wellman Engineering Co.	70
International Harvester Co.	38, 39, 81	White Mfg. Co.	59
Iowa Mfg. Co.	45	Wooldridge Mfg. Co.	59
Irrington Form & Tank Corp.	62	Worthington Pump & Machinery Corp., Worthington-Ransome Constr. Equip. Div.	41
Jaeger Machine Co.	8, 9	Yaun Dragline Buckets & Mfg. Plant	61
Jahn Co., C. R.	40		
Jax, Inc.	80	Ziegler Co., Inc., Wm. H.	69

CON-VAY-IT CUTS CONSTRUCTION COSTS

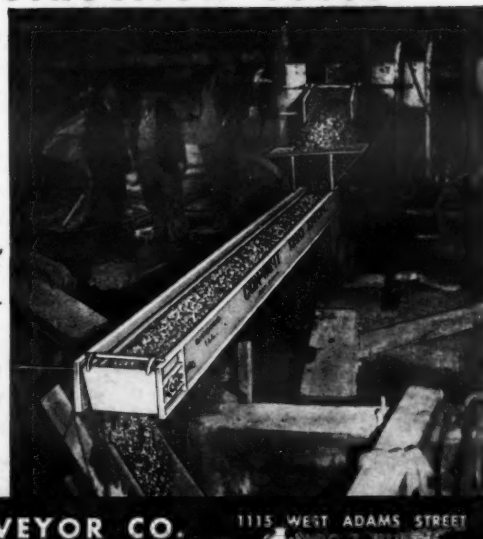
Contractors using this marvelous new Concrete Conveyor are saving as much as 80% on the cost of pouring concrete.

CON-VAY-IT speeds the job too! Electrically operated, it delivers up to a cubic yard of wet concrete a minute—down, horizontally, or to a height of 8 ft. Other models are available for greater heights.

It will pay you well to put CON-VAY-IT 12-20 Concrete Special to work for you without delay—write TODAY for details.

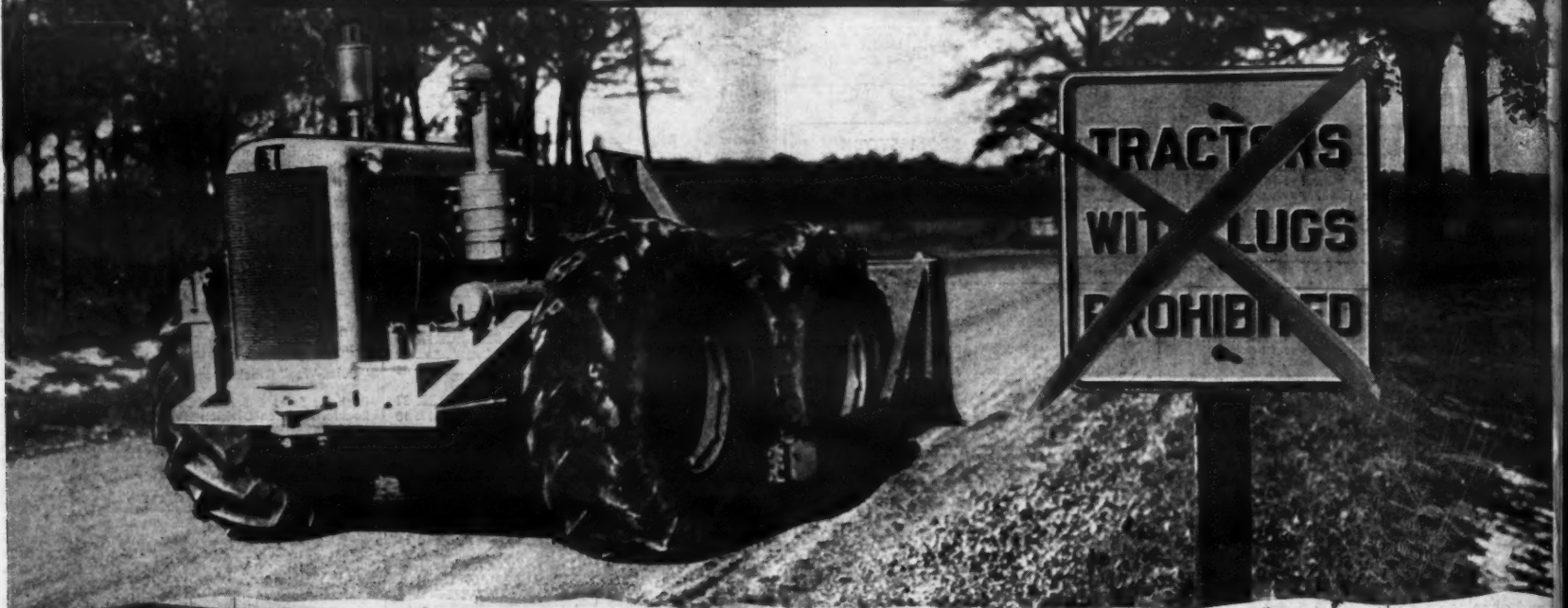
AMERICAN CONVEYOR CO.

1115 WEST ADAMS STREET
CHICAGO 7, ILLINOIS



TOURNADOZERS

can go anywhere!



Across rails — Tournadozer is ideal for use along railroad right-of-way . . . it can cross and recross tracks at will . . . drive right down the track . . . without damage to rails or ties.



Over curbs — Tournadozer climbs curbs easily . . . without time and effort wasted laying planks. Big, low-pressure, rubber tires will not crack or chip curbing . . . special rayon cord adds to tire strength.



Inside plants — Tournadozer's 180 h.p., pushing or pulling power, accurate control and maneuverability can be used profitably in buildings or on any floor surface designed to sustain heavy equipment.

"TRACTORS WITH LUGS PROHIBITED", is a road sign you can forget when you own a rubber-tired Tournadozer. This rig rolls easily over any surface . . . concrete pavement, macadam, black-top, gravel, sidewalks, plant floors . . . anywhere, without surface damage. Tournadozer can cross rails, curbs or driveways without planking . . . drive swiftly to any job without the expense and delay of securing a flat bed hauling unit.

½ Mile is only 2 minutes away

The Tournadozer's ability to make self-powered moves at 15 m.p.h. saves you time and money. You can drive a mile in 4 minutes . . . a half-mile in 2 minutes! You get there faster . . . complete the job more quickly . . . return in less time.

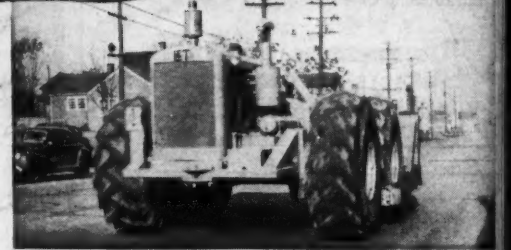
Dozes 30% Faster

Tournadozer is faster on the job, too. With four speeds forward and reverse up to 15 m.p.h., you can doze a full load 30% faster . . . back up for next pass three times faster . . . complete your dozing cycle in 1/3 the time it takes a slow-moving crawler. With constant-mesh, constant-power transmission and instantaneous speed selection, Tournadozer can travel 200 feet in the 10 seconds a track-type dozer wastes shifting gears.

Extra maneuverability and power

In addition, its 180 h.p. Diesel and 21:00 x 25 ground-gripping tires give you all the traction, dozing and pushing power you need for your all-around dozer work . . . plus twice the speed and maneuverability of a cumbersome, limited-travel crawler.

Tournadozer—Trademark CB6a



City streets — Tournadozer rolls smoothly along highways or streets . . . makes self-powered moves job-to-job . . . accurate controls give easy steering . . . multiple-disc air brakes give quick, safe stops.



Over asphalt — Tournadozer has no cleats to chew up sun-softened gravel, asphalt or macadam . . . rubber tires safe on black-top or any road surface, in summer or winter.



In yard areas — Tournadozer works safely on any type yard-area surfacing. Power, mobility and speed cut costs on a variety of industrial plant applications. Gets around at speeds to 15 m.p.h.

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PEORIA, ILLINOIS



TOURNADOZERS